THE ENGINEERING AND MINING JOURNAL
AND
COAL

Entered at the Post-Office of New York, N. Y., as Second-Class Matter.

VOL. XXXVII. APRIL 5, 1884. No. 14.

RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

NOTE.—Communications relative to the editorial management should be addressed to EDITOR, P.O. Box 1833, New York.

Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND, P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus *; and only for articles so signed is he responsible.

SUBSCRIPTION PRICE, including postage, for the United States and Canada, $4 per annum; $2.25 for six months; all other countries, including postage, $5.50 = 224. = 28 francs = 22 marks. All payments must be made in advance.

FILE COVERS will be sent by mail for $1.25 or delivered at office for $1 each.

Advertising Rates.—See page vii.

Mr. C. A. Green is our accredited representative for New York.

Mr. A. R. Brown, Jr., is our accredited representative for Boston and the Eastern States. Office, Room 1, Simmons Building, 38 Water street, Boston.

Mr. J. Viennot, 150 South Fourth street, Philadelphia, is our accredited representative for Pennsylvania, Maryland, and Delaware.

Mr. O. D. Cotton, Columbus, O., is our accredited representative for Ohio, Illinois, Missouri, Iowa, Michigan, Indiana, and the Southern States.

Mr. O. J. Frost, care Boston & Colorado Smelting Company, Argo, Colo., is our accredited representative for Denver and vicinity.

REMITTANCES should always be made by Post-Office Orders or Bank Drafts on New York, made payable to THE SCIENTIFIC PUBLISHING COMPANY.

THE SCIENTIFIC PUBLISHING CO., Publishers.

R. P. ROTHWELL, Pres. HENRY M. GEER, Sec. and General Manager,
P.O. Box 1833. **27 Park Place, New York.**

CONTENTS.

EDITORIALS: PAGE.
The Depression in the Iron Trade and the Iron Ore Mines of New Jersey. 249
The New Methods of Making Assay Returns Ended by the Withdrawal of the Omaha & Grant Smelting-Works 249
Prof. H. Carvill Lewis's Open Air Lectures on the Geology and Mineralogy of Eastern Pennsylvania 249
The Progress of Works for Burning Pyrites instead of Brimstone 249
Tailings as Assets 249
The Work of Boilers and the Steaming Qualities of Different Kinds of Fuel 249
New Publications 250
Official Statements and Reports 251
Modern Progress in Mine Engineering.—IV 252
Failure of Iron Shaft-Tubbing at the Baneux Colliery, Belgium 253
The New Worthington Mine Pump 254
The Utilization of Tin Plate Scrap 254
On Precautionary Measures against Explosions of Fire-Damp.—I 256
The Drainage of the Surface Waters of the Ontario Mine, Utah 257
Furnace, Mill, and Factory 257
Railroad News 258
Labor and Wages 258
Mineral Patents Granted by the United States Land-Office 259

COAL TRADE NOTES:
Canada 258
Colorado 258
Pennsylvania 258

COAL TRADE NOTES: PAGE.
Virginia 259
West Virginia 259

GENERAL MINING NEWS:
Arizona 260
Arkansas 260
California 260
Canada 260
Colorado 260
Dakota 261
Georgia 261
Idaho 261
Michigan 261
Montana 261
Nevada 261
New Mexico 261
Pennsylvania 261
Utah 261
Vermont 261
Wisconsin 261

FINANCIAL:
Gold and Silver Stocks 262
Copper Stocks 262
BULLION MARKET 262
METALS 265
IRON MARKET REVIEW 263

COAL TRADE REVIEW:
New York 266
Philadelphia 266
Pittsburg 266
Buffalo 266
Boston 267
Statistics of Coal Production 267
Advertisers' Index xii.

How seriously the depression in the iron trade has affected the output of the iron ore mines of New Jersey may be gathered from the fact that, according to Professor G. H. COOK, State Geologist of New Jersey, their output was only 521,416 tons in 1883, against 932,762 tons in 1882.

THE withdrawal of the Omaha & Grant Smelting and Refining Company from the number of the works which entered into the smelters' agreement on October 10th, 1883, ends the movement for introducing new methods of making assay returns. The strongest opponent of the new regulations was the Silver Cord Mining Company, which withdrew from the market.

UNDER the auspices of the Academy of Natural Sciences, of Philadelphia, Prof. H. CARVILL LEWIS will deliver a course of twenty lectures upon the geology and mineralogy of Eastern Pennsylvania, every alternate lecture being given on Saturdays in the open air, at different localities of geological interest in the neighborhood of Philadelphia. The final lecture, on June 21st, will treat of coal and the methods of surface and underground mining, as illustrated in the neighborhood of Hazleton. Professor LEWIS will follow this up with a summer school of geology at the Delaware Water-Gap during the week from June 28th to July 5th. The plan is one which will no doubt appeal to many as one particularly well conceived, and we heartily wish it success.

HOW rapidly the manufacturers of sulphuric acid are realizing the advantages of burning pyrites instead of brimstone, is illustrated by the fact that, out of a total of about sixty works, nineteen are now using pyrites, two more are almost ready to begin to burn it, and at least five have decided to erect the suitable plant. Of those now using it, one works is at Portland, Me.; one respectively at Everett, South Wilmington, North Weymouth, and New Bedford, Mass; one at Bridgeport, Conn.; one in St. Lawrence County, and one at Hunter's Point, N. Y.; one at Bergen Point, one at Camden, and two at Elizabeth, N. J.; one at Philadelphia, Pa.; one at Baltimore; two in South Carolina, at Beaufort and at Port Royal; one at Atlanta, Ga.; one in Chicago; and one in Detroit. The two additional works which are soon to commence burning pyrites are both in New Jersey. It is gratifying to note this rapid progress, which promises to form the basis of a very large mining industry.

IT seems to be becoming an accepted practice on the part of our silver mining companies to carry large quantities of tailings as an asset. The Alice Gold and Silver Mining Company has a nice little pile of 70,000 tons, which it values at $5.50 per ton. The Ontario Mining Company, from whose report we print full abstracts this week, has similarly impounded a large quantity of tailings, and is allowing them to figure on its books for a large amount. Aside from the fact that this looks very much like a condemnation of its own officers' work, one point is particularly striking, that there are no statements to substantiate the claim that there is a margin of profit in reworking the tailings. Nothing else is vouchsafed the stockholders except the bald assertion that so many thousand tons are on hand, valued at so many hundreds of thousands of dollars. While a mine like the Ontario is using its entire milling facilities day and night to rush through $100 rock, and is beginning to provide for a greater capacity, it is not likely that it will waste its efforts in fussing with $10 or $12 tailings. It is undoubtedly good policy not to allow material to go to waste which may in the future become an important source of revenue: but we fail to see why it should figure as an asset, very problematical in its character, when no one of its officers thinks of putting into that class of property the thousands of tons of ore immediately available for extraction. They might with much more justice figure out the ore in sight in the mine, and let that take its place as an asset. It is probable that its contents of the precious metal will be long converted into the coin of the country and rest peaceably in the vaults of the U. S. Treasury before the tailings have once more been put through a mill.

A SUBJECT that has been discussed in this country on many occasions in the technical and the daily press, at gatherings of engineers, before municipal committees, etc., is that concerning the best means of ascertaining as correctly as possible the work of boilers and incidentally the steaming qualities of different kinds of fuel. It is a question which comes up almost daily in computing the duty of pumping-engines; and yet no organized effort has yet been made, so far as we know, to lead to an agreement upon some standard system, which would furnish results more readily comparable. At times, results of tests of boilers and engines, glaringly inaccurate, have been challenged and their unreliability clearly proved; but there is reason to fear that from indolence many have been allowed to escape criticism. It is with special interest, therefore, that the work of two leading societies abroad, the German Society of Engineers and the Association of Boiler Inspection Companies, has been watched. A joint committee has formulated its experience and its aims in a series of instructions how to proceed in testing boilers and engines, and after submitting its first draft to the criticism and comment of the members of both organizations, has now come forward with a second modified report. In our issue of *Coal* for September 19th, 1883, we summarized the instructions of the one, and may be permitted to refer at some length to the second. It might seem almost superfluous to mention many of the points insisted upon, if there were not cases on record in which the simplest precautionary measures have been neglected. Thus, it is distinctly stated that the conditions at the beginning and at the end of a test should be as closely identical as possible; a boiler, for instance, must carry the same quantity of water at approximately the same pressure.

Fuel must be carefully sampled and an analysis of it made, giving the quantity in fractions of a kilogram of carbon c; hydrogen, h; sulphur,

s; oxygen, o; and moisture w; data from which the theoretical calorific value of the fuel may be computed by the use of the following formula:

$$8100\,c + 29000\left(h - \frac{o}{8}\right) + 2500\,s - 600\,w;$$

while the quantity of air L required for the combustion of one kilogram of fuel is calculated as follows:

$$L\text{ (cubic meters)} = \frac{2{\cdot}667\,c + 8\,h + s - o}{21 \times 1{\cdot}43}100.$$

Temperatures of the escaping gases below 360 degrees Celsius should be measured with a quicksilver thermometer, while temperatures above are best determined calorimetrically. At intervals of from ten to fifteen minutes, samples of the gases of combustion are taken; and if they show the presence of notable quantities of carbonic oxide, the combustion is incomplete. If the losses thus arising are to be accurately determined, analyses of the gases must be made. If the result was k per cent of carbonic acid, o per cent of oxygen, and n per cent of nitrogen, then the ratio, 1 to v, of the quantity of air used to the theoretical quantity is found as follows:

$$v = \frac{21}{21 - 79\,\frac{o}{n}}$$

The quantity of the products of combustion of one kilogram of fuel is calculated as follows:

$$1{\cdot}854 \times c = K \text{ cubic meters carbonic acid.}$$

$$K \times \frac{o}{k} = O \text{ cubic meters oxygen.}$$

$$K \times \frac{n}{k} = N \text{ cubic meters nitrogen.}$$

The total quantity of the gases of combustion of one kilogram of fuel is computed as follows, W, the amount of steam in them, being calculated from the moisture w, the hydrogen in the fuel, and the water in the air used for combustion:

$$3{\cdot}667\,c + 1{\cdot}430\,O + 1{\cdot}257\,N + W = K + \frac{K\,(o+n)}{k} + \frac{W}{0{\cdot}805} \text{ cubic meters.}$$

The loss of heat occasioned by the fact that the escaping gases of combustion have a higher temperature T, than that of the air t may be approximately computed as follows, 0·32 being assumed to be the average specific heat of the gases of combustion:

$$\left(0{\cdot}32\,\frac{c \times 100}{0{\cdot}536\,k} + 0{\cdot}48\,(9\,h + w)\right) \times (T - t)$$

The losses due to the dropping of fuel through the grate and to the retention of the particles of it in the clinkers and ash, must be directly determined, while the loss of heat due to the fact that ash and clinker are removed in a hot condition may be neglected.

NEW PUBLICATIONS.

Report of the New York State Survey for the Year 1883. James T. Gardiner, Director. Albany. 1884. Octavo, 182 pages. Six Maps.

The annual report of the Commissioners of the State Survey, with which this volume opens, contains a brief account of its origin, character, organization, and history, and furnishes strong arguments against the recommendation of the Governor, that this work should be turned over to the State Engineer and Surveyor. The Commissioners say:

"That the State Survey, in its objects and in its execution, has the approval both of the tax-payers and of those interested in the advancement of knowledge in the State, is shown by memorials from many of the great corporations who are particularly interested in the security of boundaries and the accuracy of surveys of real estate; from a large number of prominent lawyers of New York; and from the faculties of the Rensselaer Polytechnic Institute, Cornell University, the Union University, Columbia College, Hamilton College, the University of Rochester, Hobart College, and Vassar College. . . . It will be observed that the geographical positions given in our report are headed 'preliminary geographical positions,' the reason being that, until the triangulation is carried around to a check-base on the Hudson River, near Kingston and Poughkeepsie, the final adjustment can not be made, and the final positions correctly given. The whole work will be corrected back, when the Hudson River is reached, by the return of the triangulation along the southern tier. The work is therefore now in the condition of a bridge, partially completed, which can not be of full service until all parts are built. The experience of other countries shows clearly that there will be eventually, in this State as in every other, a thorough triangulation of its area. There can therefore be no doubt that the State Survey, if not completed now, will be taken up and finished hereafter; but any such interruption will result in rendering it more expensive, as well as delaying the time when the State can reap the advantage of the adjusted and fully completed work."

The report of Director Gardiner contains, in addition to a summary statement of the primary, secondary, and tertiary triangulation accomplished during the year, a most interesting special report on work done in Orleans, Genesee, Erie, and Niagara counties. This part of the State, as is well known, contains the great Tonawanda swamp, covering about sixty square miles, lying in three hydrographic basins, and drained (or, rather *not* drained) by three streams. The reclamation of this waste is desirable on sanitary as well as economic grounds. But local efforts are comparatively useless, in the absence of a complete examination of the whole area. This Mr. Gardiner has made, and his report on the subject shows the feasibility of draining the Oak Orchard basin, and thus relieving the Tonawanda lands. Incidentally, it gives many facts of wider application. By a discussion of the meteorological observations made at Rochester for more than fifty years, it is shown that during the cutting-down of the forests of Western New York, from 1830 to 1880, the annual rain-fall steadily increased, from a mean of 27·7 to 38 inches, the average being 34. But this increased rain-fall is not exhibited, except in localities where the climate is affected by Lake Ontario. Elsewhere in the State, there has been little or no change either way, from the average of fifty years ago.

This confirms the opinion that the removal of forests does not reduce the amount of rain. It does, however, certainly affect the flow of streams, particularly in two respects. The first of these is the diminution of the flow by an increased evaporation. Mr. Gardiner's statistics establish with considerable certainty a general law, that the average flow in streams draining wooded and swampy basins will be from 60 to 80 per cent of the mean rain-fall; while those draining undulating pasture and woodland generally receive only from 50 to 70 per cent. Hence, the average increase of evaporation by the removal of woods from a district may amount to 10 per cent of the annual rain-fall; and since the summer and autumn flow is chiefly affected, this may be reduced 25 per cent, the winter and spring flow not being greatly altered.

There is also the familiar effect produced by removing the forest mold, which retains moisture, retards the drainage, and thus prevents freshets, while it secures to the streams a more uniform flow. In this particular, another agency has been probably even more potent than the destruction of timber: we mean the sub-soil drainage so extensively adopted by farmers, to which intelligent judges have ascribed much of the recent increase, year after year, in the devastating floods of our Western rivers. This subject Mr. Gardiner does not discuss, his purpose being merely to ascertain the necessary size for the drainage-channels of the Big Swamp. But, as we have remarked, what he furnishes incidentally is a timely and valuable contribution to the forestry question. We trust the survey will be continued; and we see no reason for removing it from the skillful hands in which it has been from the beginning.

Cours d'Exploitation des Mines. (Text-Book on Mining.) By Prof. Haton de la Goupillière. Volume I. Paris: Gounod. 1884. 8vo, 791 pages.

Professor Haton de la Goupillière, of the Ecole Supérieure des Mines, Paris, is a writer well known in France, and best known to engineers in other countries as one of the busiest members of the recent French Fire-Damp Commission. He has undertaken a work in which M. Courbes so many years since so brilliantly led the way—that of compiling a text-book on mining. French literature has some able afforts to point to in this direction; but unfortunately the rapid progress of the past decades has bereft them of all but an historical value. M. de la Goupillière has had the courage to grapple with an undertaking which all mining men will acknowledge to be one of great magnitude. We have been particularly interested in examining how he has gone about it, because our own literature does not possess a single work that is worthy of being accepted as a text-book. While fully appreciating how much thought and labor have been devoted to the work before us, we can not pronounce it even an approach to our ideal, which Lottner-Serlo's treatise comes nearest to. M. de la Goupillière follows in a general way the natural division of his subject, though apparently he seems to lack perspective in some cases. He begins with a chapter on prospecting, followed by what appears to us a very brief review of the characteristics of ore-deposits and the accidents to which they are liable, and then goes into the boring of holes and wells. This is followed by a discussion of the different methods of removing rock, drilling by hand, by machinery, coal-cutting, blasting, and explosives. In the third part, he takes up timbering, masonry, driving levels, and sinking shafts; while the fourth treats in detail the many methods of mining. The last section discusses underground transportation. Hoisting, pumping, ventilation, and dressing are to be the subjects of the second volume, not yet issued, so far as we know. Such is, in a general way, the plan of the book. Reviewing it in detail, we find the geological introduction to be admirably clear and concise, and the discussion of the general points influencing the value of a deposit good, though, of course, hampered by the necessity of avoiding specific statements. In no branch of technical science is generalizing so dangerous and difficult as in mining, and M. de la Goupillière will not get much hearty indorsement in this country of expressions of opinion like the following: "In a general way, it may be admitted that a bed lying nearly horizontal will, so far as uniformity of thickness and richness is concerned, be more advantageous than a vein or a bed dipping at a high angle." His statements referring to the formation, mechanically, of fissure-veins, and the influence of the country-rock, express the experience of miners well, though it is hardly fair to put forward, and print it in italics into the bargain, such a dictum as the following, "The best parts of a vein are those in country-rock of average hardness;" nor are we satisfied to accept without serious objections the rule that "The steepest parts of a vein are the richest;" nor would we be guided in a new district by the statement that "The rich parts of a vein are often parallel with the direction of the stratigraphical system to which the fissure belongs." Professor de la Goupillière seems to have so much confidence in the value of such rules that he actually in a separate chapter goes into elaborate mathematical calculations that are to serve in directing work. We protest. What is wanted is an accumulation of evidence, critically and thoroughly examined in every case, of the behavior of mineral deposits on the dip and the strike. There are so many conditions besides the dimensions of a fissure pure and simple that affect the distribution of ore in it, or its concentration at certain points, that it is exceedingly unsafe to treat its exploration as a matter that can be settled by computation. It is much more valuable in computing the direction and distances for the recovery of veins faulted, and there M. Haton de la Goupillière's graphic method will be welcomed as valuable.

The chapter on the drilling of bore-holes is short, but is a very good summary of European practice, though the use of the diamond drill as a prospecting tool, both below and above ground, is not sufficiently appreciated, probably because it has not been extensively applied for that purpose abroad. On the other hand, there is a chapter, unusually elaborate, on artesian wells. The treatment of the ordinary tools for breaking down rock, and the description of the methods of charging holes and firing shots are good, while, on the other hand, scant justice is done to so important a subject as explosives. Rock-drills are dismissed in eleven pages, inclusive of space occupied by illustrations, which include only the Dubois & François and the Ferroux drills and their carriages. Coal-cutters are slighted in a similar manner. Timbering and masonry, on the other hand, are very well and fully treated, modern methods of forcing levels and pits through bad ground receiving adequate attention. Special mention is made of different systems of sinking shafts deeper below existing levels without interfering with the work of hoisting or pumping in them, a piece of work which, so far as we know, has not occurred in Ameri-

can practice. The most elaborate and, in our judgment, by far the most valuable part of M. de la Goupillière's first volume is that on mining methods, which occupies 260 pages. Profusely illustrated, it is, we believe, the best discussion of the subject, as a whole, in the literature of any language. French colliery engineers have had exceptional difficulties to contend with in this respect, and have devoted much study to the subject, the fruit of which is gathered by M. de la Goupillière. He presents it admirably arranged, enters into the questions at issue in a forcible manner, and gives many examples. In itself, it forms a treatise which would be studied to great advantage by every mining engineer in this country. The closing section, that on underground and surface transportation, is very well written, and, on the whole, does justice to it, although, for instance, cable tramways are dismissed with too little detail, considering their importance.

The work is throughout well equipped, and is written in that clear, concise style that is characteristic of French authors. To vein miners, it may in many instances prove defective, being evidently compiled by one who is by far more familiar with collieries. This fact encourages the belief that the second volume, being devoted to such subjects as hoisting, ventilation, and pumping, will be free from such imperfections, which, as we have pointed out, mar the harmony of the first.

OFFICIAL STATEMENTS AND REPORTS.

THE RIDGE COPPER COMPANY, LAKE SUPERIOR, MICH.

The Ridge mine has done very little work during the year 1883, its product having been only 66,380 pounds of mineral from 1150 tons of rock stamped, the shipments aggregating 77,010 pounds of mineral, which yielded 77·58 per cent of ingot, or 60,155 pounds. This realized $7805.80, to which must be added sales of silver of $221.37, while the mine expenditures were $10,253.50. The stockholders have authorized the officers to sell the mine, and negotiations have been carried on with some English parties who now hold an option on the property, giving them the right to take it on the payment of $75,000, on or before the first day of August next. Assurance is given that parties will be sent to examine the property early this season, and that on a favorable report the sale will be consummated.

The Ridge has not been a fortunate mine. It started with a fully paid-up capital of $200,000, and called assessments aggregating $210,000, and paid dividends only as follows: 1873, $50,000; 1874, $20,000; 1875, $20,000; and 1880, $9784.50; a total of $99,784.50. Its entire sales of copper aggregated $968,003.57.

THE FRANKLIN MINING COMPANY, LAKE SUPERIOR, MICH.

The year 1883 has been a prosperous one for the Franklin mine, and it was able to pay a dividend of $80,000 out of the profits of the year's business, leaving assets of $225,194.32, or slightly less than last year, taking into account the fact that then the stock of copper on hand was overvalued by 2½ cents per pound. There is not included in this the value of 25,256 tons of rock now broken in the mine, but not hoisted. The mine produced 3,489,308 pounds of ingot in 1883, against 3,264,120 pounds in 1882, and 2,667,952 pounds in 1881. The mill treated 125,775 tons of rock, producing 4,305,315 pounds of mineral averaging 81·04 per cent of ingot, thus showing that the rock carried 1·71 per cent of mineral, or 1·38 per cent of copper in 1883, against 1·34 and 1·10 per cent in 1882. The mine realized from the sale of 3,418,456 pounds of copper, at the high average of 15·661 cents, $535,389.78, and $850.40 from the sale of silver. The principal items of expenditure were $367,756.91 mine agent's drafts, $51,724.85 for smelting and freight, $3395.74 for insurance and storage, and $9236.05 for brokerage, expenses, copper charges, taxes, etc. The mine had on hand on the 1st of January 1,386,110 pounds of copper, which, valued at 14¼ cents, a fair figure, represented $206,183.87. The mine is looking well, and appears to be in a position to return a profit even at present low prices of copper.

THE ATLANTIC MINING COMPANY, LAKE SUPERIOR, MICH.

Like all the other Lake Superior copper mining companies, the Atlantic has not escaped the effects of the low prices of the year 1883. The mine produced in 1883, 3,857,258 pounds of mineral, which yielded 69·53 per cent, or 2,682,197 pounds of ingot copper. The sales during the year were 2,385,585 pounds, which realized on an average 15·08 cents, or $359,720.17. Valuing the 284,604 pounds unsold at 14·5 cents, and deducting the decline, $4326.62, in the value of the copper at the smelting-works on December 31st, 1882, $40,373.06, against $36,046.44 (300,387 pounds at 12 cents), on December 31st, 1883, the net value of the product of the year was $396,661.13, to which is added balance of interest account, $2131.87, a total of $398.793. The net operating expenses were $336,969.32, leaving a mining profit of $61,823.68. Deducting cost of a land purchase and the expenditures for construction account, there remained a net gain of $50,708.36, from which a dividend of $40,000 was paid. When it is considered that the rock treated contains only 13·708 pounds of copper per ton, or 0·685 per cent of that metal, the perfection of the entire system will be realized.

The cost of underground work was $143,338.65, including the sinking of 89·7 feet at an average of $23.88, drifting 3089·7 feet at $9.23, and stoping 10,422 fathoms at $9.82. The surface expenses were $55,460.67, the railroad expenses $13,980.64, and the stamp-mill expenses $69,176.74.

During the year, 195,669 tons of rock were treated in the stamp-mill. Per ton of rock treated, the cost was as follows:

WORKING EXPENSES PER TON OF ROCK.

Gross value of product	$2.02·72
Cost of mining, selecting, breaking, taxes, and surface expenses	$1.01·60
Cost of transportation to mill	.07·15
Cost of stamping and separating	.35·35
Cost of freight, smelting, marketing, and New York office expenses	.28·11
Total working expenses	$1.72·21
Total expenditure	1.77·89
Net profit	$0.24·83
Profit, including interest earned	0.25·91

It will be seen, therefore, that, in working 0·685 per cent rock, the net profit is about 25 cents a ton when copper is 15 cents a pound.

Mr. William Tonkin, the agent, in his report refers to the fact that, where the richest portions of the lode are found, the hanging-wall is unreliable, so that large blocks of rich ground must be left for pillars. It seems, too, that the hanging-wall grows weaker as depth is attained, so that timbering becomes more costly and expensive.

THE ONTARIO SILVER MINING COMPANY, UTAH.

The report of the Ontario Silver Mining Company, one of the most prosperous mining companies in this country, and quoted almost daily as an example of the great success attending such enterprises, is of exceptional interest. The president, Mr. J. B. Haggin, of San Francisco, in transmitting the reports of the officers of the company, refers to the fact that the expenses of the mine are at present large, and will continue to be so for some time, for the purpose of running drain-tunnels to intercept the water, and that, owing to the lack of milling facilities, the dividends may be reduced. We understand that, for quite a long time, Mr. Russell, assayer and chemist of the company, has been making experiments with the leaching process invented by him, with the co-operation and advice of Mr. C. A. Stetefeldt. The results have been of a very encouraging character, and will, we presume, lead to the building of a leaching-mill, the outlay for which will not be as heavy, if rolls are used for crushing, as the expenditure for an ordinary amalgamation mill. Turning first to the report of the superintendent, Mr. B. C. Chambers, we find that the bulk of the ore extracted during the period under review, from April 1st, 1881, to November 1st, 1883, was from the 600, 700, and 800-foot levels, the bulk of the reserves being in the west ground. In the lower levels, the ore averages as well as that in the upper sections of the mine, nor does the length of the ore-body on the strike appear to have lessened, while there is still good ore in the upper levels. Concerning the new work, Mr. Chambers speaks as follows:

We commenced the work of excavation of No. 3 shaft in April, 1881. The excavation, being in a steep hill-side, was necessarily very large. The ground being very loose, retaining-walls to the extent of over 200 feet in length, and over 20 feet high, and 5 feet at the base, were built, consuming a large quantity of rock.

The dimensions of the buildings are as follows, namely: Hoisting-engine room, 140 feet by 40 feet; adjoining on the west is the pumping-engine room, 58 by 48 feet; and on the east the boiler-room, 82 by 41 feet; on the north of the pumping-engine room is the carpenter-shop, 64 by 46 feet; northwest of this is the blacksmith-shop, 40 by 32 feet; south of the boiler-room, is the coal-house, 65 by 42 feet, capable of holding 1000 tons of coal; car-house, north of shaft, 42 by 16 feet; water-tank, west of carpenter-shop, 32 by 22 feet; boiler-tank, north of boiler-room, 32 by 16 feet; and a water-tank house on the hill, 35 by 22 feet, giving pressure of 200 feet on three hydrants at the works. There are also other small buildings about the premises connected by tramways with shops and ore-house, as well as waste-dumps—all in complete order.

The shaft is divided into three compartments. The two hoisting are 4½ by 5 feet, and the pump compartment 7 by 9 feet, with enlargement at bob and pump stations, all heavily timbered, and at certain places double-timbered, to stand swelling ground.

The shaft is now sunk to a depth of 890 feet, and we are cutting and timbering stations at the 700 and 800-foot levels; also the pump and bob stations are being excavated and timbered.

This shaft is connected directly with the drain-tunnel at the 600-foot level, and through it we constructed a part of the drain-tunnel north to connection running south, from intermediate shaft No. 4, and are now doing all our hoisting through it from the drain-tunnel branches south of the shaft. At a point 424 feet south of this shaft, we cut the vein or lode, and have run a level east upon it 176 feet, and connected with the old 600-foot level of No. 2 shaft, and have also run west on the vein 201 feet, which has developed a fine ore-body of over 240 feet in length, and is as promising as any portion of the mine now worked or discovered. I am now making an uprise or winze on this ore-body, which is up 30 feet from the level in very fine ore—this being virgin ground, unexplored to the surface, and the full breast of the tunnel west is in solid ore, which is certainly one of the most important developments yet made in the mine.

The hoisting-engines are direct-acting, with steam-cylinders 20 inches diameter by 5-foot stroke, steel shaft, double reels for 6-inch flat ropes, and are fitted with all appliances for economical, quick, and safe working. They have a hoisting capacity of 1200 tons per day, from a depth of 2500 feet. Double-deck cages are used in both compartments.

The pump-hoist for working the pump compartment has two 18-inch steam-cylinders, with improved form of gearing, and power to raise 15 tons. They are supplied with powerful brakes, enabling them to handle the heavy pumps and pump-rods with the greatest ease and economy. The pumping-engine is of the Cornish style, double-acting, with fly-wheel, is fitted with all the modern appliances, and has the greatest pumping capacity of any pumping-engine on the Pacific coast. The high-pressure cylinder is 38½ inches in diameter, low-pressure 70 inches, with equal stroke of 10 feet, having power to drive a double line of 20-inch pumps, 10-foot stroke, at a depth of 2000 feet. It is set upon a solid foundation of stone, which, from the nature of the ground, required over 7000 tons of quarried work. This pumping machinery greatly reduces the cost of freeing the mine of water, consumes much less fuel, and reduces the expenses for manual labor both at the surface and in the mine. There is also located in the hoisting building one No. 7 Burleigh compressor of the latest design and construction, with all the pipes and receivers necessary to drive the five Ingersoll power drills with which the mine is supplied.

In the boiler-room, there are four pairs of 54-inch by 16-foot steel boilers, with double steam-drums, steam-pumps, piping and fittings, making the same complete in every particular. All the pumping and hoisting machinery at this shaft is of the most approved style and construction, and was designed by and erected under the supervision of Messrs. Salkeld & Eckart. The mine is now well supplied with shops and all necessary tools to make our own repairs. The machine-shop is quite complete, with two lathes, planer, and drill-press, and all necessary machinery for doing the most of our work. With our present works and machinery, we are in better condition to carry on the mine with greater facility and more economy than we have done for the past three years, and the prospect for a fine product is certainly very flattering for several years to come.

Since my last report, we have constructed or run a drain-tunnel. We broke ground and started work July 1st, 1881, and turned the water into

it at shaft No. 3 July 31st, 1883. The tunnel has a flume the entire length, 3 feet wide and 20 inches deep, with grade 3 inches to 100 feet, and is now carrying an average depth of water 7½ inches. The tunnel is well timbered and the flume well constructed of red pine timber.

In the construction of this tunnel, we encountered much troublesome ground, some of it very hard to work and much of it soft and bad to cave. At a point 2800 feet from the mouth of the tunnel, we sunk an intermediate shaft, 299½ feet deep, to the tunnel line, through very hard rock, and from this point we worked both north and south until connection was made from the mouth of the tunnel.

The tunnel begins at a point below the mill, and running south 14° 35′ east to a point under the mill, a distance of 565½ feet, and under the ore-floor of mill a depth of 132 feet; thence running south, 16° 05′ west, to shaft No. 3, a distance of 5125 feet; total length of tunnel from mouth to shaft No. 3, 5690½ feet; or, including excavation at mouth of tunnel (33 feet), making a total of 5723½ feet in length to shaft No. 3; thence continuing on the same course until we cut the vein, 424 feet south from shaft No. 3; thence on the same course 93 feet farther, making the total length of the drain-tunnel 6240½ feet. From this point, I am running east and west in the foot-wall of the vein, for the purpose of draining the surface water in the foot-wall country and keeping it from draining to the different levels of the mine, and have now completed 219 feet west and 290 feet east of main line. This lateral drain tunnel running parallel with the vein is an experiment, but so far has proved very successful, and I believe will continue to do so.

According to the accounts presented by the secretary, Mr. Irwin C. Stump, shaft No. 3 cost $478,362.07; the pump machinery, $136,967.53; the drain-tunnel, $205,161.33; and the boilers and machinery, $73,051.12. The total expenditures for mine construction and drainage-tunnel were $1,004,728 32 in two years and eight months. During the same time, an outlay was made for new property, the purchase of the coal lands of the Home Coal Company for $93,039.49, and of a series of mining claims west of the property of the company, aggregating 2400 feet by 1200 for $469,718.41, or together, $562,757.90, making the total outlay for extraordinary purposes $1,567,486.22, while the dividends were $1,800,000. At the time when dividends were suspended, one of the grounds given was, that it was proposed to obtain control of the Utah Eastern Railroad. We do not find any reference to this subject in the report.

Below we reproduce the itemized statement of the mine and mill expenses. It is to be regretted that, in this as in similar reports by other companies, no details are given of the quantities of fuel, material, etc., used, number of shifts worked, etc.:

Mine:	Total.	Per cent.
Labor	$382,181.32	40·16
Boarding-house	82,767.06	8·69
Oils	12,467.18	1·31
Tools	4,904.70	0·52
Coal	356,365.26	37·45
Lagging	4,904.33	0·52
Timbers	27,089.82	2·85
Wood	42,240.92	4·44
Powder and fuse	15,423.08	1·62
Lumber	9,829.63	1·03
Candles	11,969.79	1·26
Charcoal	1,458.30	0·15
	$951,601.39	
Mill:		
Wood	80,040 53	8·59
Hauling ore	31,429.48	3·37
Labor	247,253.12	26·55
Coal	69,910.14	7·51
Construction	134,536.11	14·23
Assaying	14,118.83	1·52
Oils	12,047.86	1·29
Chemicals	12,050.35	1·29
Tools	1,735.33	0·19
Charcoal	5,098.49	0·55
Boarding-house	49,206.99	5·28
Salt	117,359.88	12·60
Supplies	50,510.63	5·42
Lumber	5,711.39	0·61
Quicksilver	100.282.43	10·77
	$931,291.56	

These figures give an idea of the proportion of the expenditures for a variety of purposes. It will be noted how heavy an item fuel is, both in the mine and mill account, though, presumably, the purchase of coal mines will reduce it; and, so far as the mine is concerned, the completion of the drainage-tunnel will prevent its growing too speedily with depth and area of workings. The summary given above includes the expenditures for boarding-house, which, however, are more than balanced by the receipts, stated to have been, during the period under review, $168,020. The report contains two sets of financial statements, the one including, and the other excluding, November. The former does not give the number of tons worked, so that we have not been able to show the itemized expenditures per ton. The other, by the superintendent, makes due deduction for such receipts. The cost was distributed as follows, exclusive of such extraordinary expenses as cost of tunnel, of the works at shaft No. 3, etc.:

Cost of extraction	$12.50 per ton.
Cost of reduction, including improvements	15.10 "
Cost of hauling	0 54 "
Cost of prospecting	1 66 "
General expenses	3.76 "
Total	$33.56 "

The total yield was $5,388,986.55 net, or $105.86 per ton, or 95·78 ounces per ton, making the net return per ounce of silver $1.10. The liabilities of the company are $54,016.04, while its assets are placed by the secretary at $1,169,163.19. The superintendent places the value of improvements and property at $2,336,267.73; and the market value of the mine ranging between $3,750,000 and $4,000,000. It should be stated, however, that both statements include the value of 70,000 tons of tailings at the mill at $589,000.

We reproduce elsewhere Mr. J. E. Clayton's report on the drainage of the surface water above the 600-foot level, which is considered an admirable diagnosis of the troubles which at one time threatened seriously to embarrass the mine. We understand that his suggestions are to be acted upon, and the mining public will look with more than usual interest to the carrying out of a plan which, so far as we know, is novel in American practice. We trust that in the future Mr. Clayton will submit to the profession the full details of the work.

The report is accompanied with maps drawn by O. A. Palmer, M.E., of Salt Lake City.

ALLOUEZ MINING COMPANY, LAKE SUPERIOR, MICH.

The Allouez Company produced, during the year 1883, 2,408,675 pounds of mineral, yielding 72·71 per cent of ingot, or 1,751,377 pounds of refined copper, which realized 15·13 cents a pound, or $265,066. The working expenses aggregated $279,921.44, and in addition there was an outlay of $26,525.12 for construction and improvements, thus showing a loss of $41,380.56. The underground expenses were $112,390.87, including the sinking of 268·3 feet of shafts at an average of $14.36 per foot, 1630·6 feet of drifting at $9.84, and 6523·6 fathoms of stoping at $6.48, and $14,504.30 as the cost of running the compressor and power-drills, including repairs. The hoisting expenses were $21,063.25, of which $11,106 were for fuel, while the cost of selecting and breaking rock was $24,196 02. The surface expenses were $17,902.78, the cost of transporting 102,388 tons of rock on the railroad $10,720.02, and the cost of stamping the same quantity of rock $52,875.30, or 51·64 cents a ton; the items being $20,127.77 for labor and superintendence, $23,715.40 for 7330 cords of wood, $3993.25 for supplies, and $5038.88 for foundry bills, etc. Per cord of wood, 13·9 tons of rock were stamped. The mineral expenses, transportation to Hancock, barrels and cooperage, and assaying cost $5169.94. Smelting cost $23,422.65, freight $7143.67, brokerage $1314.31, and other items aggregated $38,864.82.

The following summary of results is particularly interesting, as showing how successful were the efforts to reduce working expenses:

COST PER TON OF ROCK MILLED—ALLOUEZ MINE.

	1882.	1883.
Mining { 112,892 tons in 1882 / 120,824 tons in 1883 }	$1.33 93	$1.09 77
Hoisting	.20·15	.20 57
Selecting and breaking	.23·35	.23 63
General surface expenses (less rents)	.08 67	.14 30
Transportation to mill	.13·58	.10 47
Stamping and washing	.55·52	.51 64
Expenses on mineral	.15·17	.05 05
Freight, smelting, marketing product	.40 50	.37 96
Total	$3.00·87	$2.73·39
Gross value of product per ton	3.09·37	2.58·88
Cost of copper marketed per pound	.17·38	15·98
Refined copper per ton milled	0·865 p. c.	0·855 p. c.

Almost the entire reduction in the cost is due, it will be noticed, to the lowering of the cost of mining, and that we have reason to believe is to be attributed chiefly to the use of power-drills. On the construction account, we notice an item of $5823.85 for the second half of the 16·5 by 30 compressor and four Rand drills. The mine was troubled in the beginning of the year by the breaking down of the old locomotive, now replaced by the "Gratiot," which cost $9393.45. To secure greater economy, Berryman feed-water heaters have been put in. The directors have decided that, in order to reduce the cost, the only alternative was to enlarge the capacity of the stamp-mill one half, and have therefore called an assessment of $40,000.

MODERN PROGRESS IN MINE ENGINEERING.—IV.*

By H. Bramall, M. Inst. C.E.

In the design and construction of head-frames for carrying the winding pulleys, a better appreciation of the principles of framing in carpentry is shown than was formerly the case, and for very deep pits iron has been substituted for timber, either in lattice column, plate web girder, rolled girder, box girder, or tubular girder form. The legislature requires that the tops of all shafts when not in use shall be fenced; but at all well-regulated collieries, shafts while in use are protected by movable fences, a provision which presents no difficulty, and which has undoubtedly saved many lives. Similar means ought to be taken to protect all openings into shafts in metalliferous mines.

The necessity before alluded to, of getting the largest possible daily output of material from some of the very costly modern deep shafts, has led to the invention of several schemes for lessening the delay in changing the tubs in the cages. In one plan, stages are fixed to correspond with the floors of the cages; in another, there are subsidiary cages worked by hydraulic rams; and in yet another, the rails in the cages on which the tubs rest are tilted as the cage settles on the catches, so as to cause the tubs to run out of the cage, while, by similar elevation of rail, by a small hydraulic ram, the empty tubs run in and take their place. The difficulties of conveying prompt and distinct signals in very deep shafts have been overcome by the application of electric bells with the best results, and, where inclines are worked by engines placed upon the surface, the benefits afforded by this system are very manifest, while the telephone, which has been introduced in several mines, affords an invaluable means of communicating with the surface by audible messages, to the great saving of time and economy of winding power.

The common means of ingress and egress of the miners in metalliferous mines is by ladders, entailing a severe and exhaustive tax upon the energies of the men. To remedy this evil, a machine has been devised, known as the man-engine, consisting of a reciprocating rod to which platforms are attached, and on and off which the men step in their progress to or from the surface. This has been extensively applied in Germany, in some instances on a very large scale, as at Przibram, where one is 800 yards deep, intended to be extended to 1000 yards; and another at Clausthal, 712 yards; while several have been introduced into Cornwall. In collieries, the custom is to wind the men in the cages used for winding coal, and where downright shafts are available, as in America, this method is also applied in other mines, it being incomparably the best and safest method. The Prussian reports for 1881 give the number of deaths per 1000 as:

Where cages and ropes are used	·081
Where ladders are used	·084
Where man-engines are used	·383

* President's Annual Address to the Liverpool Engineering Society.

These returns seem to be conclusive as to the esteem in which these clumsy and dangerous machines ought to be held.

The pneumatic system of raising a load, patented in England in 1845,* has been practically applied at Epinac colliery, Saône et Loire, on a large scale for hoisting coals from a depth of 656 yards, which it is intended to farther extend to a depth of 1093 yards. An air-tight wrought-iron tube, 5 feet 3 inches diameter, is placed in the shaft and fitted with a piston cage carrying nine tubs, and, the air being exhausted above the piston, a load of 3 tons of coal is raised thereby at a rate of about 19½ inches per second.

Having to deal with a heavy, bulky commodity of low value, which often has to be transported considerable distances under difficult or disadvantageous conditions, the question of improved means of conveyance has necessarily occupied a large share of the attention of colliery engineers, and its importance is now very generally recognized. To secure the maximum efficiency, roads under ground should be laid out so as to have as easy gradients and be as straight and free from abrupt turns as is possible. Rails of sufficient rigidity, with broad bearing surface and round tops should be adopted, and the sleepers should be put in at regular intervals of say 3 feet, and well packed. The axles of the tubs should be kept well lubricated, and the wheels should be as large in diameter as circumstances will permit. The ratio of dead to live weight should be diminished as far as possible, to which end steel wheels, besides possessing very remarkable durability, will be found to materially contribute. That there is room for improvement will be admitted when we remember that the tractional resistance on railroads is not more than 8 pounds per ton, and on street tramways 22½ pounds, while in colliery underground roads and trams, it is rarely less than 35, and often reaches 50 and even 60 pounds, surely at least double what it need be.

The transmission of power for underground purposes is scarcely of recent date, and there are few collieries that do not avail themselves of it in some form. In the earliest methods, haulage was adopted for inclines by engines fixed either on the surface or underground, the boilers also being sometimes placed below. Steam can be conveyed from the surface in well-clothed pipes for from 300 to 400 yards without any serious loss; but the difficulties of disposing of the waste steam, and the risk and dangers attending the placing of boilers underground, have limited the use of such plants to situations near the pits. Hydraulic power has been applied in certain special cases, chiefly for pumping, and in a few cases to drive hauling engines; but this can only be available where there are facilities for disposing of the waste water. Recently, power has been transmitted underground by endless ropes and clip-pulleys; but this method is of only limited application. The successful utilization of compressed air at the Mont Cenis Tunnel showed mining engineers how efficient an auxiliary it might be, and gave an enormous impetus to the application of machinery underground. True, it is not the most economical method of transmitting power, but it is a convenient one. By it, power is easily conveyed with very small loss in transit to the most remote portions of a mine, where it may be useful either for hauling or pumping, or for boring or coal cutting. There is no risk of fire or damage to roads by heat or waste steam or water, no need for any provision to carry it away when spent, as the very refuse air having done its work becomes a valuable agent in cooling and ventilating the working place, and even leakage from the conveying pipes should not be considered as all loss, since it serves the same useful purpose. The loss due to the heat generated in the compressors has been considerably reduced by M. Cornet's method of injecting water spray, which takes up this heat and also saves loss by leakage and clearance, and a useful effect in the air of from 80 to 85 per cent is thus obtained. The useful effect got out of the air-driven engine may be taken in practice as from 30 to 35 per cent of the prime motor, although with the best arrangements an efficiency of 50 per cent has been recorded. Seeing how great a share of attention electricity has of late attracted to itself, it is not surprising that its use as a transmitter of power to the interior of mines has been attempted. At the Perronière mines, it is used to convey power from the surface, a distance of about 1300 yards, and is there driving a hauling machine, the useful effect obtained being from 12 to a maximum of 26 per cent. At Zankerode, it is used for haulage by Siemens's electro locomotive, and there and at Blanzy to transmit power to small interior ventilating fans. In England, at Trafalgar colliery, it is employed to drive a small pump in the workings. The difficulty and uncertainty of maintaining perfect insulation, and the liability to sparks when this fails and when contact is broken, render it unadvisable to introduce such an element of danger into fiery mines, and the small amount of power capable of being thus transmitted, and the low percentage of useful effect obtained, are such as must greatly tend to limit its application to peculiar and special conditions.

The application of power to underground haulage has been greatly extended of late years, the systems which have been found most convenient and economical being the endless rope or chain and the tail rope. But these systems entail the establishment of fixed engines and long ropes, with liability to derangement at angles and bends in the roads and some complication at branches. The greater simplicity of haulage by locomotives has induced trials of them, and at Laxey, at Doman in Hungaria, and in America, those of ordinary type have been introduced in adit levels with considerable economy; but they are objectionable from the smoke and steam given off, and of course could not possibly be admitted into any mine liable to give off explosive gases. Locomotives driven by compressed air carried in a reservoir were used in the St. Gothard Tunnel, and since then in several places, and this plan is adopted in the Mékarski and Scott-Moncrieff trams; and in the locomotive designed by Lishman & Young especially for mining purposes, and now in use at the Earl of Durham's and Cannock and Rugeley collieries. Colonel Beaumont has constructed a locomotive in which he employs very high pressure (1000 pounds per inch), and the air is expanded in two cylinders; but as it requires the use of a stove, it is unfitted in its present form for mine use. None of these systems has yet been long enough working to justify an opinion as to whether it offers notable advantages over those with fixed engines.

* An English patent was granted in 1844 for a system of raising a load by vertical tubes similar to those of the atmospheric railroad.

In the Royal colliery, Zankerode, an electrical locomotive on the Siemens system is engaged in drawing coal-tubs along a level 678 yards to the shaft, which is about 240 yards deep. The train consists of 15 tubs of about 1595 pounds gross weight each, and is drawn out in 4½ minutes, the useful effect being from 21·5 to 30 per cent of the prime motor on the surface. The cost is a little less than by horses; but the sparks given off on breaking contact with the conductors are an element of danger that could not be tolerated in any fiery mine. The comparative efficiency of the various systems may be approximately stated as follows:

Endless rope	Power utilized 77 to 92 per cent.
Endless chain	75 "
Tail rope	55 "
Compressed air	30 " 50 "
Hydraulic	25 " 30 "
Siemens's electric locomotive	20 " 30 "
Beaumont's compressed air	20 "
Electric hauling up incline	20 " 26 "

FAILURE OF IRON SHAFT-TUBBING AT THE BANEUX COLLIERY, BELGIUM.*

By P. Banneux.

The rupture of the cast-iron tubbing of a shaft at the Bâneux colliery, in the province of Liége, in Belgium, claims the earnest attention of mining engineers. The accident is striking, both from its novelty and from the fact that none of the universally adopted elements of security were absent. A committee of eminent engineers had designed the work, the quality of the materials and workmanship was beyond question, and the directorate had even increased the dimensions recommended by the engineers.

The tubbing of the Bâneux shaft was required to resist the pressure of 42 meters (138 feet) head of water. It extended from the thill of a coal-seam up to a hight of 44 meters, the distance to surface being 60·5 meters; and it was composed in hight of seventy-two sections of 0·60 meter each. This length of tubbing of 44 meters was divided into three equal portions, in which the thickness of the metal differed. In the lower portion, this thickness was 34 millimeters (1·33 inches); in the middle portion, it was designed to be 26 millimeters; and in the upper portion, 19 millimeters. But, during the execution of the work, these portions were increased to 30 and 26 millimeters respectively. The shaft was not circular, but four-sided, the sides being unequal and curved, a form common on the continent. In this shaft, one segment was made to span the whole distance on each side. The segments on two opposite sides were curved to a radius of 3·85 meters (12·63 feet), giving a chord of 2·5 meters, and a versed sine of only 0·22 meter. On the other two opposite sides, the segments were curved to a radius of 3·50 meters, giving a chord of 2·60 meters, and a versed sine of 0·27 meter. The segments were bolted together at the angles in the usual manner, the joints being made with strips of lead 3 millimeters (0·118 inch) thick. On the inside of each segment, were three strengthening ribs, each 85 millimeters (3·34 inches) deep. It is customary to calculate the thickness of such tubbing on the assumption that the shaft is circular, and of a diameter corresponding to the curvature of the segments. Calculated on this basis, the thickness of the lower tubbing should have been, for the larger diameter, 32·34, say 33 millimeters, and for the smaller diameter 29·4, say 30 millimeters. The thickness actually given was 34 millimeters in both cases. Thus, the dimensions adopted were not only arrived at in the manner sanctioned by experience and in conformity with the common practice, but, as an additional security, these dimensions were slightly exceeded. Thus, nothing was wanting to give confidence in the solidity of the structure. Yet this tubbing, calculated, as it was supposed, with a wide margin for safety, to resist a head of water of 42 meters, gave way when the head had reached only 35 meters. The rupture occurred in the middle of the segments, and extended from the bottom to a hight of 18 meters through thirty-one successive segments.

The purpose of the author of this report is to show that tubbing of this character is not subjected solely to a stress of compression, as in the case of circular shafts: and that consequently the calculations which are based on that assumption are erroneous and dangerously misleading. He demonstrates that such segments are exposed to a transverse strain by the extremities being forced outward against the pressure which holds the center in position; that is, the force which is brought to bear upon those pieces tends to cause flexure, and the strain thus set up increases with the radius of curvature. Such a strain tends to break the segment in the middle, in the manner in which the rupture occurred at Bâneux. A careful measurement of some of the deformed segments showed that the versed sine had been diminished by from 1 to 2 centimeters, while their chords had been increased by from 2 to 4 centimeters. The author recommends the adoption of a greater thickness of iron in these cases, and suggests the necessity of taking precautions to counteract the tendency of the angles to yield under the action of the external pressure. In the new tubbing designed for the Bâneux shaft, these suggestions have been acted upon, and the structure is probably the most massive that has yet been constructed.

THE Erie Railroad Company has given notice of a cut in coal rates from $1.50 to $1.15 to shippers along the Alleghany Valley Railroad. This is regarded as the first blow at the Rochester & Pittsburg, but the officials of that company say they can draw coal 10 cents cheaper than the Erie, and they will undoubtedly cut rates also.

THE iron-workers at the Douglas furnaces of Pierce, Kelly & Co., the Spearman Iron Company, and the Mabel furnace of Perkins & Co., at Sharpsville, Pa., have all struck because of a reduction from 10 to 15 cents in the wages of laborers, iron-carriers, and fillers. The employers are firm, and say that the condition of the iron market forced the reduction. The workers at Middlesex have accepted the reduction.

* Abstract of a paper in *Annales des Travaux Publics de Belgique*, vol. xxxix., 1882, pp. 331-345. From the Proceedings of the Institution of Civil Engineers of London, edited by James Forrest, Secretary.

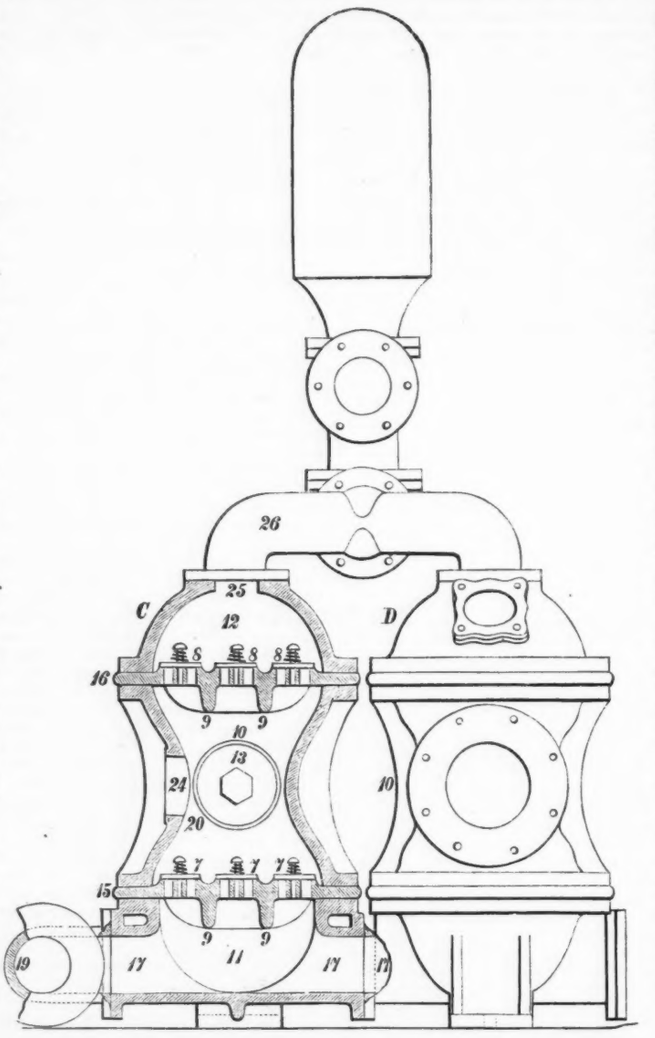
THE NEW WORTHINGTON MINE PUMP.

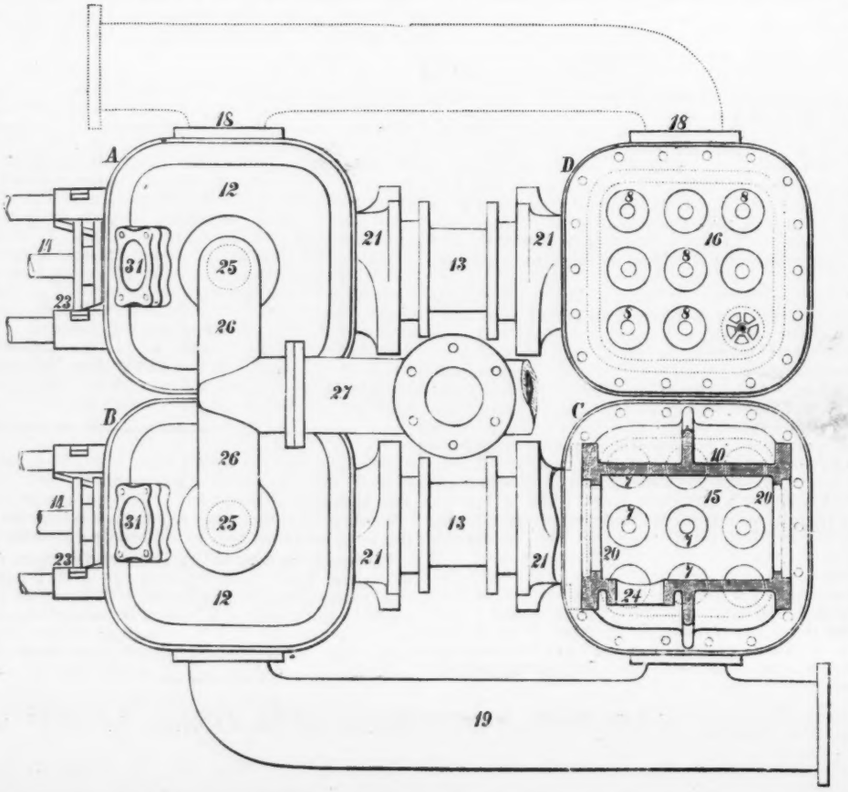
It is a very difficult matter to design and construct a steam-pump that will satisfactorily meet the exacting requirements of mine pumping. The service is generally rough, severe, and continuous. Great care must be exercised, both in the selection and adaptation of the material used in construction, as the water to be pumped is often of a kind that will attack and quickly destroy it. The location of the mine is usually remote from supplies, and any necessity for renewals or repairs, unless they can be made with unskilled labor and with little delay, may be attended with serious consequences.

These considerations, therefore, demand that a mine pump should be extraordinarily durable, simple, and efficient, and have led to the construction of the form of Worthington pumping-engine that we illustrate this week.

Its principal feature is, that the plungers work through central exterior stuffing-boxes into four separate and distinct water-cylinders so constructed as to be interchangeable both as a whole and as to each particular part. Each of the cylinders is provided upon its opposite sides with openings, 20, which are adapted to receive the stuffing-box of either the plunger or the plunger-rod, and also with openings, 17, by which the induction-pipe can be attached at either end. This feature of interchangeability is one of great importance in a pump of this character. By it, not only is avoided the necessity of keeping in stock a large number of parts, differing from each other in shape and size, but the operation of erecting the pump is simplified and the replacing of broken or worn-out parts greatly facilitated. If a single set of parts is kept in stock, any casting can be replaced without the delay incident to ordering it from the manufacturer.

The valve areas and water-ways are unusually large in proportion to the displacements of the plunger, so that the velocity, and consequent destructive action of the water-currents, are decreased. The plungers, piston-rods, stuffing-boxes, and the entire suction and force valve-plates, are made of a metallic composition that has been found best adapted to resist the attack of sulphurous water. These valve-plates are removable, and can, when worn, be replaced with little trouble and comparatively slight expense. It will be noticed that the supply-pipe, 19, can be placed either side of the pump, or turned either way, and that the discharge-tee, 28, can also be turned in any direction. The pumps are designed to safely withstand a working pressure of 200 pounds to the square inch, and all their attachments are especially strengthened with the view of meeting the rough usage and hard work to which, in this service, they are liable to be subjected.





THE old Baird gas-well property at Elrods, Pennsylvania, consisting of four acres of ground, has been purchased by W. D. Wood & Co. The purchase was made by the firm for the purpose of securing the well, from which it will supply with gas its works at McKeesport. The work of boring will begin at once.

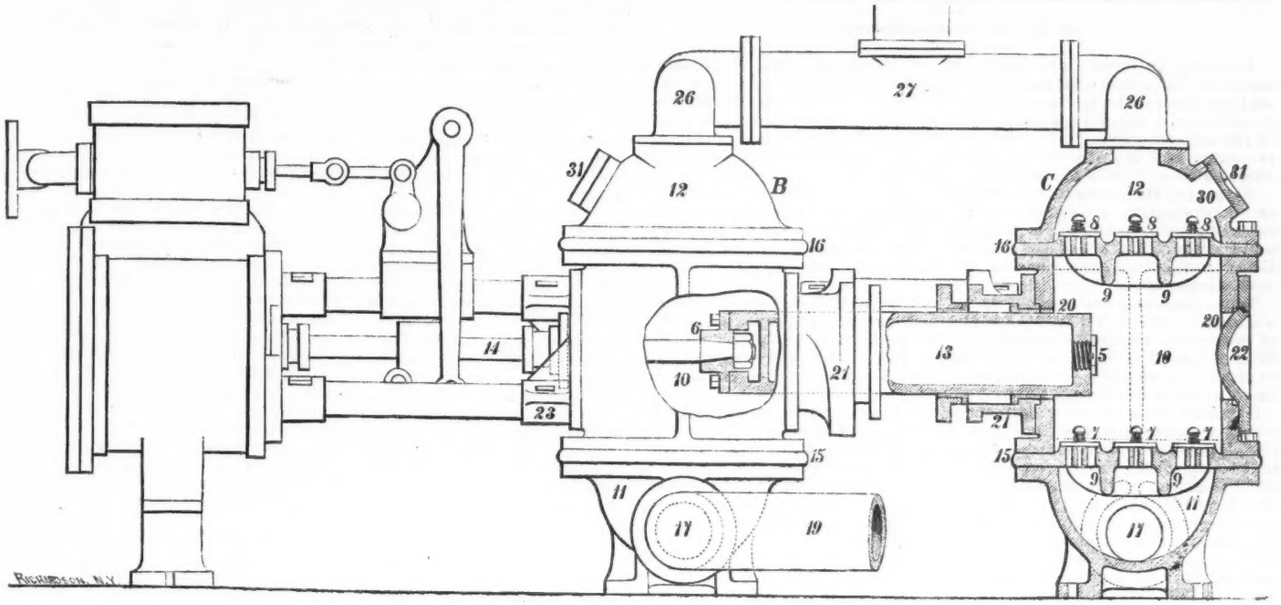
THE UTILIZATION OF TIN PLATE SCRAP.

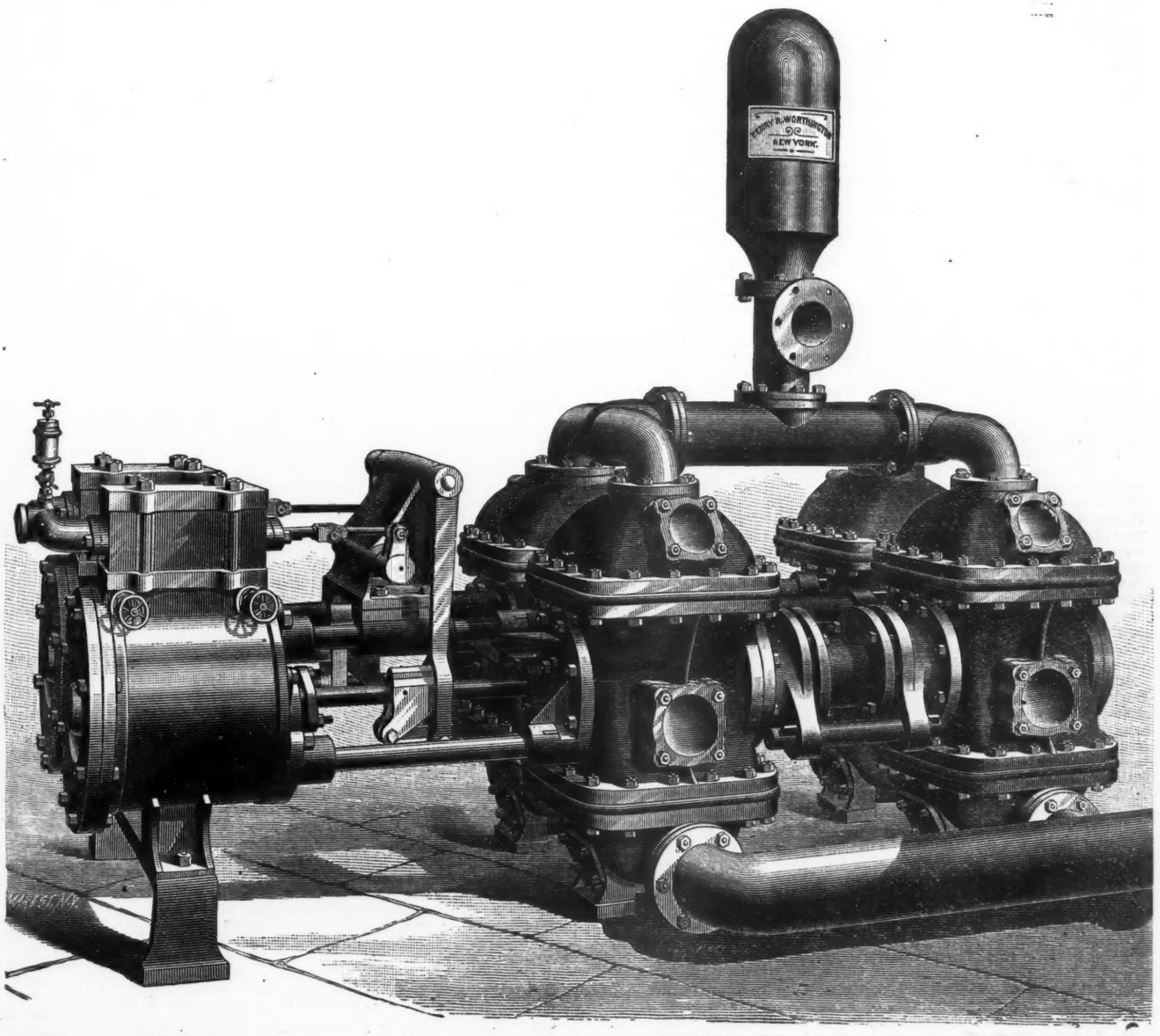
Innumerable efforts have been made during the past fifteen or twenty years to utilize tin plate scrap, both in this country and abroad, but, so far as we have been able to learn, without success, commercially or technically. Special interest, therefore, attaches to a method recently perfected in Germany, on which encouraging reports come to us through the German Society of Engineers. It is the invention of Dr. L. Czimatis, of the Rhenania Works, Stolberg, near Aix-la-Chapelle. He puts the tin scrap into a rotating cylinder provided with a steam-jacket, in which it is treated with a lye of caustic soda, containing oxide of lead, the result being that the tin dissolves and an equivalent amount of metallic lead is precipitated in the form of mud. The apparatus is so designed that the lye is afforded but little opportunity to absorb carbonic acid. The scrap is discharged automatically, and is delivered into washers, the office of which is to clear off the adhering lead slimes; and then it is submitted to a final process, to get rid of that part of the tin which is alloyed with the iron. The lye is boiled down for stannate of tin, or the oxide of tin is precipitated from it by carbonic acid, the carbonate of soda being treated with lime to regenerate caustic soda. The lead is reconverted into oxide by exposure to air at a red heat, and is then used over again.

The value of the iron remaining after the treatment has hitherto been so much impaired by the presence of small quantities of tin that that point has usually brought about the failure of the many attempts made in this direction. It troubled Dr. Czimatis in the beginning, he being unable to get it below one per cent at first, and 0·1 per cent later. Of late, however, the average of a series of analyses has been only 0·038 per cent of tin in the scrap after treatment. This quantity does not appear to injuriously affect the mechanical properties of iron made out of the scrap, some of the tests made showing a tensile strength of from 47,000 to 50,000 pounds, and an elongation of from 20 to 24 per cent. The quantity of tin on tin plate averages about 5 per cent, equal in value, with tin at 18 cents, to $18 per ton of scrap, not counting the value of the iron.

PARTIES interested in the Bonair coal-fields, six miles from Sparta, Tenn., are in consultation with the officials of the Nashville, Chattanooga & St. Louis Railroad, with the object of constructing a road from the mines to connect with the McMinnville & Sparta branch at Sparta.

WATER-GAS IN MASSACHUSETTS.—The Legislative Committee on Manufactures, at Boston, Mass., came to a conclusion, March 28th, on the proposition that the statutes shall be so amended that the manufacture of water-gas for an illuminator may be authorized in Massachusetts. Its report will be that the clause limiting gas percentage of carbonic oxide in illuminating gas should be repealed, and that the limitation of the capital of a gas company to $500,000 should also be taken off. There will be a minority report dissenting from both decisions.





THE NEW WORTHINGTON MINE PUMP.

ON PRECAUTIONARY MEASURES AGAINST EXPLOSIONS OF FIRE-DAMP.—I.*

By M. Hoernecke, Halle, Germany.

In many collieries, marsh-gas, or, as the miners call it, fire-damp, issues under certain circumstances both from the coal-beds themselves and from the rocks interstratified with them. If mixed with certain proportions of air and ignited by some cause, an explosion results, which, in the narrow openings in a colliery is not only destructive to life and property, and is liable to cause fires, but is dangerous also to life, through the effects of the product of combustion.

Naturally, the increased consumption and the corresponding growth in the production of coal have led to an increase in the number of explosions of fire-damp and of its victims. The greater depth of the mines and the concentration of the workings have caused the gathering of a larger number of men, and single explosions have therefore become more disastrous.

These great calamities strongly excite the public and have frequently led to the opinion that modern mine engineering is not equal to the duty of preventing fire-damp explosions. This opinion has been confirmed by the fact that well-known scientists have attempted to show that explosions have some connection with earthquakes, or have attributed them to the attraction of the moon.

Greater confusion was caused in the views of the public by the fact that, only six years since, the Academy of Sciences at Paris brought forward the proposal to ignite the fire-damp by open lights and thus remove it, and that this proposal has been recently brought forward in the Society of Electricians at Berlin, so modified that the explosions were to be brought about by electric lights in the galleries. These proposals do not even possess the merit of novelty, because, in former centuries, according to the barbarous customs of the times, a fire-man (*pénitent*), drawn by lot, had to light the fire-damp, and often lost his life. The use of the electric spark for igniting the fire-damp was referred to in the *Journal des Mines* in 1857, with the restriction, however, that it was not the purpose to prevent the formation of the dangerous mixture, but to prove its presence, and possibly to light it under certain circumstances at the right time, and make it harmless.

Mining engineers in all countries have for a long time been busily engaged in energetically meeting the enemy threatening them in the shape of fire-damp, in preventing its accumulation and lessening its disastrous consequences. The administrations have sought to incorporate the experience gathered in their laws as soon as possible. One reason why these efforts have not thus far been completely successful is, that it requires many years of practical experience to choose the adequate measures at the right time and at the right place to meet danger often unexpected, and that science has furnished very little thus far which might be available in practice to successfully combat fire-damp explosions. It will require a long period of co-operation on the part of a large number of experienced scientists and engineers to gather facts that will bear fruit; but even such work will not bring with it absolute safety and a total removal of the danger of explosions. For even if success attends the efforts to obtain exact information concerning the nature of fire-damp, and to take the most elaborate measures against the dangers resulting from its presence, it will, nevertheless, be as little possible to prevent the greater number of explosions caused by accident or carelessness, since the rule, "Concentration of work and ample ventilation," has thus far in practice led to them.

Starting on such a purely practical basis, a commission was appointed in France in 1877, to investigate the causes of colliery explosions, and similar commissions were formed in England and Belgium in 1879, and in Saxony and Prussia in 1881. All of them have furnished ample and valuable material for discussion of the questions at issue. It is to be hoped that these numerous efforts will lead to the discovery of practical means to lessen the danger of fire-damp explosions.

1. *The Occurrence of Fire-Damp.*—The first historical data relating to the occurrence of fire-damp are found in Robert Plot's *Natural History of Staffordshire*, in 1686, according to which "fire-damp" or "wild-fire" was one of the seven different kinds of gas found in the collieries there. The historian, Bartholomæus Fisen, of Liége, mentioned, in 1696, that the miners in Belgium removed the flame of fire-damp by beating with rods and waving with cloths, and it is probably in this period that the barbarous custom originated of having the fire-damp lighted every day before the shift by the so-called "fireman." Martin Triewald describes, in the transactions of the Swiss Academy of Sciences, a larger explosion as having occurred in 1721 at Ridley's Byker colliery, near Newcastle, by which thirty-one miners and fourteen horses were killed. The fire-damp question was therefore agitated in England and Belgium in the last century.

In Germany, fire-damp occurred only rarely until within thirty years, because the shallowness of the mines and the large number of connections between them and the surface were not favorable to its accumulation. It was then only that with the opening of deep mines, and the necessity of avoiding the sinking of many costly shafts, the ventilation became more complicated, and the number of explosions and their magnitude grew. Although the number has not increased since 1860 in proportion to the increase in the production, it is, nevertheless, large. According to the experience thus far acquired, it must be assumed that the danger of explosions will become even greater as the workings grow deeper.

Geologically, the occurrence of fire-damp is not limited to any formation. It is found in the Wealden clay coal strata as well as in the Upper and Lower Carboniferous, in the salt deposits of different formations, and, in exceptional instances, in Tertiary lignites and in metalliferous mines.

In coal, marsh-gas is not associated with any specific quality of the coal. Although in England, and at the Gerhard mine at Saarbruecken, an increase in the percentage of volatile matter in the coal is accompanied by a larger development of marsh-gas, this is not the invariable rule in the case of the coals of Zwickau and Westphalia. Fire-damp occurs in large quantities in the anthracite mines of Pennsylvania, and it is found in all the beds of sinter and sand coals of the Worm District, Germany.

Nor is it possible to detect any relation between the horizon of coal-seams and their contents of marsh-gas, because the most recent beds, even though, as in Westphalia, they may consist of gas-coals, do not always show the largest quantities of gas. In Saarbruecken, the lower beds develop marsh-gas most abundantly, and out of the 31 seams of this group which are worked, certain seams—for instance, at Dudweiler the third, fifth, and tenth—carry a good deal of fire-damp, while the beds between and below them are almost free from it. On the other hand, the lowest group of seams in Lower Silesia develops fire-damp most abundantly, although the coal contains much less volatile matter than the upper groups. In the Chemnitz District, Saxony, workings in the middle and the lower bed seem more exposed to danger than the upper seams.

The fact that seams crop out at the surface has not, according to Von Meyer's investigations, any noticeable influence upon the quantity and quality of the gas. Observations contradictory in character oppose the general experience that the outcrop of seams is frequently free from fire-damp. In the Worm District, according to Wagner, fire-damp occurs chiefly in the anticlinals, but less abundantly in the seams of the upper horizons, which are covered by more recent strata. In Westphalia, on the other hand, the marl above the Carboniferous rocks appears to contain accumulations of fire-damp from the outcrop of the seams, which is proved by its occurrence in the underground strontianite workings recently opened. The Wealden slate above the coal-seam of Obernkirchen contains large quantities of marsh-gas; but where it is replaced by fissured Wealden sandstone, the hydrocarbons have escaped from the coal, and the latter has lost its coking qualities. In the Dresden District, in the Burgk section, fire-damp has entirely disappeared as the workings have approached the lowest parts of synclinals; while in the Brueckenberg mines, near Zwickau, fire-damp has been generally more abundant in the deeper than in the higher levels.

So far as the occurrence of fire-damp in the mines is concerned, it appears in the form of a gradual escape in the form of "blowers" and as "sudden outbursts," and in the shape of accumulations in the gob.

Gradual Escape of Gas.—When new galleries are driven into virgin ground, bubbles of gas form at the fresh fracture, which, especially if water is present, escape with a peculiar noise. Combes compares it to that just preceding the boiling of water. According to him, it is caused by the breaking off of a large number of small particles of coal through the action of the gas, which is occasionally at a high pressure. Marcilly states that a pressure of five atmospheres is necessary to prevent the gas from escaping; but Wood has measured pressures of thirty atmospheres in the gas in coal.

The noise ceases after a while, and the face has been in so far deprived of its gas as the resistance of the coal suffices to prevent its escape. By the action of heat, the development of gas is resumed after it has ceased at ordinary temperature, and the greater quantities of marsh-gas in deeper mines may be partly attributed to the higher temperature, although Marcilly has found that some kinds of coal that parted with all their gas in a few months in a cold state did not develop any more, even when heated to 300 degrees C.

In Belgium, it is claimed that, owing to the pressure of the inclosed gas, those seams in which fire-damp is most abundant are most easily worked, especially after work has been suspended for some time, and Belgian miners even go so far as to weaken the ventilation, wherever possible, in order to reap the greatest benefit from the pressure of the escaping gas. Probably the occurrence of marsh-gas in sandstones and shales above coal-seams is also due to the gradual escape of the gas from the coal, the gas rising upward in cracks and fissures until retained.

The danger arising from the gradual escape of gas from the coal can only be removed by regular ventilation. It may be lessened if there are pauses in the working that afford sufficient time for the escape of the gas.

Blowers.—There are fissures in all coal-seams and in the accompanying strata, and particularly in the vicinity of faults. They are partially filled with marsh-gas under pressure, and partly, also, with water, from which the gas issues violently if struck by the workings. If the opening into the fissure is small, a drill-hole, for instance, then the gas may be lighted without danger, before it mixes with air. Then it burns like illuminating gas, with a bluish-white flame.

After first emptying such a fissure, it may continue to be supplied with gas, which goes on developing in the adjoining seams, and the length of time during which the flow of gas is maintained will depend upon the extent of the fissure and the number of beds it crosses. Thus, there was a blower at the Tyne colliery, England, which for a year furnished from 168 to 196 cubic meters (from 5950 to 6930 cubic feet) of gas per minute, and a blower at the Wellesweiler mine, Saarbruecken, has remained active for fifty years.

The occurrence of blowers is much more dangerous than the regular issuing of gas from coal, because they are struck unexpectedly, because they ignite more easily from a shot or a lamp, and because the gas may spread throughout the workings, causing the accumulation of large quantities of a mixture which may cause the most dangerous explosions as a result of the slightest carelessness. It is advisable, therefore, to drill in advance wherever blowers are suspected, especially in the vicinity of faults, and then with the greatest precaution to tap the gas accumulated.

"*Sudden Outbursts.*"—"Sudden outbursts," known in England and Belgium, have not been observed in Germany, nor, we may add, in America. In England, the escaping gas of a lower bed tears up the floor of the workings for a long distance, often with a great noise, and issues from the crack so formed, or the hanging-wall breaks down and the gas from the upper seams comes into the workings below.

According to the researches of Arnould, these sudden outbursts have only happened in Belgium since 1847, and only at a depth greater than 280 meters. As in the case of the blowers, they are brought about by the opening of large cavities formed above the seams in the country-rock at those points where the seams have been disturbed by lateral pressure. These cavities are filled with marsh-gas under a pressure of many atmospheres; and moreover, they contain smaller or larger quantities of dust, consisting chiefly of fibrous coal, which is hurled far into the workings when an explosion takes place. At such an explosion in the Agrappe mine, there were projected 4200 hectoliters of coal, partially consisting of layers of coal above the cavity and pulverized by the explosion. Those seams in Belgium which contain larger quantities of fibrous coal are said to be richer in gas than others.

* Verhandlungen des Vereins für Beförderung des Gewerbfleisses.

In order to explain the enormous quantity of fire-damp noted with sudden outbursts, Arnould, who has devoted a good deal of attention to this subject, assumes that the hydrocarbon is present in the cavities in a liquid form, with a great tendency to evaporate, and that this is brought about by the great pressure to which the coal was subjected during its formation. He holds that the assumption is necessary that the hydrocarbon is in a liquid state, because the volume of the gas escaping bears no proportion to the small volume of the fissures that have been frequently measured, and because this only can explain the spreading of the gas in the workings at a high pressure, and the fact that the coal carried along is in the form of a powder. The lowering of the temperature that should accompany so rapid an expansion of hydrocarbon gas has been proved in some cases by witnesses who found the coal very cold and the temperature lower after the explosion than before it.

Arnould's theory is supported by the experiments of Faraday, who produced liquid marsh-gas by the application of a pressure of 39 atmospheres at 25 degrees Celsius. It is, however, doubted by many, and it is certain that a large number of "sudden outbursts" should be really classed as strong "blowers."

The strong escape of gas makes the danger of sudden outbursts greater than that attending the smaller blowers, and attempts to lessen it are made by drilling a head at all faces and by frequently suspending work.

Fire-Damp in the Gob.—The gas escaping from the coal has a tendency to mix, by diffusion, not only with the air-current, but also with the air in the adjoining gob, and to accumulate as fire-damp in the open spaces in it, while that entering the air-current is diluted and carried off.

Gurlt holds, on the other hand, that in the movement of the current of air the molecules of the heavier gas force those of the lighter gas aside, and the lighter marsh-gas is partially crowded out of the heavier fresh air and then is afforded ample opportunity to enter into ground already worked. But as this theory is based upon the experiments made by Crooks on the movements of molecules of gas highly exhausted, and this can not be said to be the condition of the air in the goaf, his theory does not appear to rest on a good foundation. Besides, good ventilation is the best means of aiding the diffusion of the gases. The fact of the accumulation of fire-damp in the gob is much more simply and naturally explained by assuming that the marsh-gas rises along those parts of the workings not well ventilated, and, moving along the roof, enters the old workings.

These accumulations in the gob are further supplied by the escape of gas from pillars, from benches not mined, or from the walls. Nasse observed at the Gerhard colliery near Saarbruecken, even ten years after certain ground had been worked, that fire-damp escaped from the gob in quantities varying with the changes in the barometer. But if the supply is not replenished in such a manner, the fire-damp gradually escapes from the old workings or is slowly oxidized to carbonic acid. The latter change was observed in reopening old sections of the mines at Blanzy, Treuil, and Bessèges, in which explosions had taken place, while lack of fresh air proved an obstacle in driving galleries through the gob which originally contained fire-damp at the Dudweiler and Sainte Barbe collieries.

The danger attending the presence of fire-damp in the gob is particularly great, because large quantities of gas are suddenly forced out of it by extensive falls of the roof. They easily cause the flame of the safety-lamp to pass through it and ignite, many of the great explosions in England being brought about in this manner. The concussion of shots at the face also often causes a movement of the fire-damp, which is then directly ignited by the flame of the shot.

The choice of the method of mining has a very great influence in lessening or increasing the danger of the accumulations of fire-damp in the gob. Although the pillars in the pillar-work generally adopted in Germany are partially or wholly deprived of their gas before robbing, the lack of rock for filling and the fact that the roof stands up well, give occasion to the formation of enormous reservoirs for the accumulation of fire-damp. In long-wall working, the weakest roof is supported so that it can only break down in a moderate degree and that large open spaces are not formed. On the other hand, the working faces, being in freshly-cut coal, develop maximum quantities of gas, and therefore necessarily require a much stronger current of air than workings on the pillar system.

THE DRAINAGE OF THE SURFACE WATERS OF THE ONTARIO MINE, UTAH.

By J. E. Clayton, M.E., Salt Lake City.

The geological formation of the country traversed by the Ontario vein fissure, is in most part quartzite, with now and then a thin shale bed intervening; but, taken as a whole, it is quartzite country-rock of great thickness, and belongs to the Carboniferous age. It is at least 15,000 feet higher in the geological sense than the Cottonwood limestones. This quartzite formation has been broken and crushed, to a great extent, by the upheaval of the mountain, and the intrusion, or eruption, of numerous large porphyry dikes into the larger fissures produced by the upheaval. These changes were not all produced by one grand upheaval, but by a series of geological disturbances, extending through long ages. By these agencies, such as earthquake shocks, local upheavals, plutonic eruptions, and evolutions of great heat, the quartzite beds were fissured and broken in every conceivable direction, without materially disturbing the arrangement of the beds in reference to each other; except along great fissure-lines, like the Ontario and the extensive porphyry dikes whose fissures extend to vast depths. On these lines of profound fissuring, the beds are faulted very extensively. The most noted of these is the Ontario fissure, on which the vertical faulting is not less than 1000 feet, the beds on the south or foot-wall side being that much higher than the same beds on the north or hanging-wall side.

There is another series of fissures that cuts through the formation from north to south at short distances apart, varying from 50 to 500 feet or more. At least four fifths of the water-flow into the mine comes in through these cross-breaks or gash-fissures in the foot-wall country south of the vein. It is through them that the sudden outbursts of water occur that have twice flooded the lower levels, and hindered the regularity of the work in the lower levels. The suddenness of these outbursts of water, when these cross-breaks are tapped by a new level, is easily understood; but there are instances when a second outbreak occurs, after the fissure is passed, and no further danger is apprehended. This can be explained easily by a careful study of the cross-fissures and the character of the *débris* filling them. This filling is brecciated portions of the country-rock and earthy infiltrations, etc. Before the mine was opened, these broken spaces were filled with water at rest, or nearly so, with only a slight tendency to move laterally, because every part of the fissure or cross-course was full of water.

When the levels were opened, the equilibrium of water pressure was destroyed, and the whole pressure incident to the hight of water in the cross-fissures south of the vein was brought to bear against the point tapped by the level. Were it not for the broken country-rock and the earthy infiltrations that choke or obstruct the free flow of water along the line of the cross-fissure to the point tapped by the level, the water would all flow out through the new opening in a few hours. The irregularities in the width of the cross-break will hold the *débris* in place, causing the water to filter through slowly, until at a later period the pressure of water makes a new opening through the obstruction, and another rush of water occurs, etc.

The bedding of the country-rock has a general dip to the north, varying from 15 to 20 degrees below the horizontal plane; the mountain rises as you go south to the summit, a distance of a mile or more; and as these cross-fissures are filled with water approaching closely to the summit of the range, the enormous lateral pressure toward the new openings made by the lower levels in the mine becomes almost irresistible.

As hereinbefore stated, the entire mass of country-rock is exceedingly fissile or fractured in every direction—to such an extent, in fact, as to obliterate, in most places, all traces of distinct lines of bedding. It therefore follows that the whole mass of country holds enormous quantities of water; but it comes away gradually and in regular quantities, whereas, that held in the large cross-breaks is liable to come with a sudden rush, when first tapped, and to repeat the operation every time another obstruction is forced out of the way by the water pressure farther back in the country, south of the point cut by the levels.

Owing to the physical structure and condition of the country-rock, as above described, it follows naturally that the Ontario mine must drain a large area of the surrounding country, especially that portion of it lying south of the vein, and generally designated as the foot-wall country.

The snow and rain-fall on this portion of the range is heavy, and the condition of the country-rock is such that the larger part of the water sinks into the ground, as there are no heavy clay beds under the soil to intercept it and head it off into the ravines; hence this annual water-fall becomes a constant reinforcement to the quantity of water held in the broken country-rock.

Draining this ground is like pumping out a lake with a large stream of water running into it. If this surface stream of water can be diverted into another channel, to flow away by its own gravity, the pumps will have that much less water to handle.

To effect this object, the drain-tunnel or adit has been run to the 600-foot level. In addition to this, it is now proposed to continue the drain-tunnel east and west in the foot-wall country, parallel, or nearly so, with the vein, and from 50 to 100 feet south of it. This, of course, would effectually drain the mine, if no levels were opened below the 600, or if there were no cross-fissures to give the surface water free passage to lower levels as soon as they are opened. Any device by which the efficiency of this drain-level can be increased is certainly deserving of careful consideration.

After a careful study of the situation, I have arrived at the conclusion that every one of the cross-fissures that are cut by this foot-wall drain-level should have a drift run south on their course, in order to puddle the fissure under foot, and give the surface water a free channel into the drain-level, and thus prevent it from settling down the fissure into the level below. The greater the distance these drifts are extended south under the water-shed that supplies the water, the more effectually will it be gathered into the drain-tunnel, and kept out of the way of the lower workings.

The quantity of water that can be intercepted and sent out through the drain-tunnel is very large; certainly not less than 2000 gallons a minute, if what is now coming out of the limited extent of the foot-wall drain-tunnel is any guide to judge by.

In view of these facts, and a careful study of the situation of the mine and its requirements, I fully approve the plan adopted for intercepting the surface water, as far as possible, by this system of foot-wall drain-levels, and drifts south of it on the "cross-courses." It is evident that all this surface water would eventually find its way down into the lower levels of the mine, unless some such plan were carried out to intercept it. The one proposed is eminently practical, and less expensive than any yet proposed.

FURNACE, MILL, AND FACTORY.

The Philadelphia & Reading Company has adopted the Williams improved Davy, and the manufacturers, James W. Queen & Co., of Philadelphia, have their hands full in filling orders. The lamp is an undoubted success.

The Wyoming Valley Manufacturing Company continues to be busy making a superior class of mine locomotives. Last week, one was shipped to Raton, New Mexico, to be used in one of the mines of the Atchison, Topeka & Santa Fé road. It is one of the Wyoming Company's own design, has 6 drivers, a cylinder 10 by 14, and is 5 feet 7 inches in hight. Some notion of its strength may be gathered from the fact that it is to do its work on a grade of 170 feet to the mile.

The Cummer Engine Company has just received an order for two of its Ballantine refrigerating machines, with condensers, purifiers, and receivers, to go into the plant of the Co-operative Brewing Company, Buffalo, New York. These machines will displace two of another make. These machines retain for years the full amount of ammonia that they are originally charged with, and in this respect effect a great saving over those of other makes, which are wasteful of ammonia gas. As this substance is very expensive, the point is worth noting. The Cummer Engine Company has five large refrigerating machines now under way, all of which are ordered. The Cummer Engine Company is also receiving orders quite freely for its engines, among some of the more recent being a 12 by 24, 89 horse-power, for Shatto & Dennis, Minneapolis, Minn.; an 11 by 20, 67 horse-power, for Stults & Kile, Orwell, Ohio; and an 18 by 36, 215 horse-power, for the Amoskeag Manufacturing Company, Manchester, N. H. The Cummer Engine Company is about to add an extension of 150 feet to its machine-shop.

The Link Belt Machinery Company, of Nos. 11 to 23 Jefferson street, Chicago,

has issued a very handsomely illustrated catalogue, showing graphically the many applications of its elevating and conveying machinery. We notice particularly its many forms for link belting for the transmission of power, the working strains being given in every instance, the freight, trough, and drop-flight conveyors, elevators with single and double strands, with centrally hung buckets and with patent discharge. An interesting form is that of a water elevator for quarries and shallow workings. The catalogue contains a large number of letters from prominent manufacturers giving their experience with the machinery purchased by them.

The M. C. Bullock Manufacturing Company, Chicago, has recently shipped a 60 horse-power straight-line engine, together with a quantity of shafting, pulleys, hangers, etc , to the Aurora (Ill.) Watch Company ; and has also recently erected a third generator for 45 arc lights for the Brush Electric Light Company, of Aurora ; and has furnished the necessary apparatus for doubling the electric-light plant at Rock Island. It has shipped an additional outfit for the electric light plant at the Studebaker Brothers' works at South Bend, Ind.

Metcalf, Paul & Co., Chicago, office of the Verona Tool-Works, have issued their annual circular of specialties, in which the number of Verona nut-locks now in use on the different lines of railroad foots up 66,468,748. They make a specialty of railroad track tools, made from the best quality of steel ; also miners' tools of all kinds. They are perhaps the only general works making an all solid steel pick. They have a considerable trade established in Colorado and New Mexico, and are receiving orders from other sections, among others one from Arizona for a sample lot of solid steel picks to be made after a pattern sent with the order.

The Gates Iron-Works, of Chicago, are putting one of their rock and ore-crushers in at the Minerva Gold Mining Company's works at Central City, Dakota. Mr. Fargo, of the Gates Iron-Works, reports a growing demand for these crushers. He says that the greatest difficulty they have had to meet in introducing the Gates rock and ore-crusher has been the incredulousness of engineers with reference to their claims, no one being willing, without seeing it, to believe the actual results possible. The only other serious difficulty has been the general impression that the Gates operated as a grinder or with a vibratory motion, whereas the motion is neither rotary nor vibratory, but *gyratory*, and continuous. Messrs. Dolice & Shepard, who supply the South Chicago Rolling-Mill Company with broken limestone for flux, have a Gates at their quarry at Haythorn, through which they regularly run 800 tons every ten hours, which, if the works require it, could easily be increased to 1000 tons, or 100 tons an hour.

The Vulcan furnace, at Newberry, Mich., is out of blast again, and undergoing certain repairs and alterations calculated to insure better results than have been obtained hitherto, the stack not working to the best satisfaction of the management. The changes contemplated will be made in a few weeks, when the furnace will again start up.

The Iron River furnace, at Florence, Mich., will be ready to go into blast about the 1st of September next. Its capacity will be from 50 to 70 tons of pig-iron a day, and Nanaimo ore will be used altogether. The stack will be 50 feet 6 inches ; 11-foot bosh and a 7-foot hearth ; which will make it larger than any in operation on the upper peninsula.

The Pittsburg *Telegraph* says that during the first quarter of 1884 two furnaces were blown out, that at Soho and one of the Isabella ; and one, the Lucy, blown in. Six are now in and five out. Daily average cast at present, 650 tons. The consumption is about 1800 tons daily, so that stocks are drawn upon heavily. These stocks are now placed at 3000 tons in this city. In the first three months of last year, the stock on hand cast was 75,000 tons ; this quarter, it was 68,200 tons.

RAILROAD NEWS.

The earnings of the Philadelphia & Reading Railroad and Coal and Iron companies for February show gross receipts of the railroad company for the month $2,002,341.78, and expenses $1,363,716.98. The gross receipts of the Coal and Iron Company for the month were $956,778.92, and expenses $1,047,555.79 ; making a loss of $288,553.03 for the year to date.

The Pittsburg, McKeesport & Youghiogheny Railroad Company will soon begin to extend its main line to Connellsville. The road is finished and in running order between Pittsburg and Broadford Junction, about three miles from that town. At Broadford Junction, a branch line is in operation over the Youghiogheny to Broadford.

M. J. W. Hopkins, fuel agent of the Chesapeake & Ohio Railroad Company, sends us the following report of the total output and distribution of coal and coke received from the mines on the line of the railroad (including mines on the Lexington Division) for the month (28 days) ended February 28th, 1884, in tons of 2000 pounds :

	For February.		From Jan. 1 to Feb. 28.			
Kind of coal.	1884.	1883.	1884.	1883.	Increase.	Decrease.
Cannel	166	3,039	279	4,711	.....	4,432
Gas	22,390	26,677	48,972	51,294	.....	2,322
Splint and Block	5,449	9,393	11,967	23,048	.....	11,081
New River, etc	36,080	34,201	76,704	65,438	11,266	.....
Coke	5,064	9,993	10,767	19,441	.....	8,674
Totals	69,149	83,303	148,689	163,932	11,266	26,509

Distribution of above.	For 28 days. 1884.	1883.
Fuel for use of company	17,183	14,215
Shipped at Huntington, on Ohio River	1,988	251
Delivered on line of Elizabethtown, Lexington & Big Sandy Railroad.	11,993	3,705
Delivered on line of Chesapeake & Ohio Railroad, excepting Richmond	946	16,906
Delivered at Clifton Forge to Richmond & Alleghany Railroad	.....	984
Delivered at Staunton to Baltimore & Ohio Railroad	32	.....
Delivered at Waynesboro' to Shenandoah Valley Railroad	4,148	105
Delivered at Charlottesville to Virginia Midland Railroad	262	5,413
Delivered at Richmond, Fredericksburg & Potomac Junction to Richmond, Fredericksburg & Potomac Railroad	8,752	491
Delivered at Richmond for consumption, including tugs, dredges, etc.	.....	12,258
Shipped at James River wharves	943	2,417
Delivered at Newport News for consumption, including tugs, dredges, etc	24,902	351
Shipped at Newport News wharves	.....	26,177
Totals	69,149	83,303

A meeting of the Western Anthracite Association was held April 1st, at the office of E. N. Frisbie, New York City, coal agent of the Erie Railroad. It lasted for more than four hours, but was without definite results. The members have endeavored to secure from the railroads a uniform tariff ; but to this end it has been found necessary that the railroads should agree on a division of the business of coal transportation. It is understood that the plan has not been perfected and that other meetings will have to be held. The absence of President Sloan, of the Delaware, Lackawanna & Western, one of the principal coal carriers, prevents the immediate adoption of any plan for a division of the transportation business. Until an agreement by the railroads can be reached, shippers of coal will secure the best rates offered by open competition.

Work upon the new branch railroad from Nanticoke to Morgantown, a distance of five miles, has been entered upon by the Pennsylvania Railroad Company. A new coal town is to be opened at the latter place by the Susquehanna Coal Company, which will at once erect breakers, shafts, and houses, and expects to ship coal at an early date.

A Denver dispatch says that the directors of the Colorado Northern and Denver, Utah & Pacific railroads have at last consolidated the two roads, and the stockholders will meet at Denver and ratify the agreement. The capital stock of the new company will be $6,000,000. It is proposed at once to extend the road from Longmont to Middle Park.

LABOR AND WAGES.

The coal workers' strike in the Anzin District, France, continues unabated. The houses of two non-strikers have been burned.

The House Committee on Labor, at Washington, has authorized a favorable report on the bill prohibiting the hiring out of the labor of United States prisoners. Violation of the act is made a misdemeanor punishable by a fine of from $500 to $1000 or imprisonment from one to two years. Mr. James has prepared a report to accompany the bill in which it is stated that in some cases persons are taken by the State prisons without cost to the government and then inhumanly treated to make their work profitable. The contract system is condemned as wholly adverse to reform and as injurious to honest labor. The report of the New York Legislative Committee is quoted as to the evils of the system.

A Pittsburg paper says that a reduction of 10 per cent in the wages of day laborers at Painter & Sons' iron mills was made March 31st. This reduction will affect about 180 men, who are receiving from $1.35 to $1.75 per day. The men affected held a meeting and passed resolutions expressing their unwillingness to accept the proposed reduction. Another meeting will be held, at which the men will take definite action in regard to the matter.

About 800 coal miners in the fourth pool, Pittsburg, have struck against a reduction of a quarter of a cent a bushel in the price of mining. It is said that the third pool operators also insist upon another cut of one quarter of a cent. The men are in no condition to strike.

The coal miners employed in Keeling's pit on the Castle Shannon Railroad, have refused to accept the tribunal award of three cents, and threaten to withdraw from the association and hereafter settle all questions themselves.

COAL TRADE NOTES.

CANADA.

PROVINCE OF NOVA SCOTIA.

According to the Stellarton *Trades Journal*, the workmen at the mines of the Joggins Coal Mining Association have suspended work. It is stated that the men have not been paid since last December.

The coal mine owners of the province have not made so good a thing out of their contracts this year as last. The price in most cases is considerably less, though, luckily for the miners, not any lower than the prices obtained in 1882. Pictou coal was contracted for in Montreal in 1882 at $4.05, and Cape Breton coal at $3.60. This year, the contract price for coal to the Canadian Pacific Railroad is, in the case of Pictou coals, a shade over that of 1882, and in the case of Cape Breton coals, the average gives the exact price at which they sold in 1882.

COLORADO.

The Northrop coal mine, at Erie, has suspended work on account of too much water. All the other mines are running on regular time.

A meeting of the directors of the Colorado Coal and Iron Company was held in New York April 1st. It was the last one before the annual election, which will take place at Colorado Springs next week. A majority of the present directors are in sympathy with General Palmer, president of the company, in his effort to keep the company from the control of the Denver & Rio Grande Railroad Company. After some routine business had been done, one of the directors offered a resolution that several salaried officers should be retained for two years, and their salaries guaranteed. The general counsel, L. K. Bass, and his assistant, Theodore F. H. Meyer, and Alfred G. Renshaw, the company's agent in London, were the officers named in the resolution. The directors representing the railroad company protested in vigorous terms against the action, but the resolution was passed in spite of the protests.

PENNSYLVANIA.

ANTHRACITE.

The Schuylkill Canal is open.

The Philadelphia *North American* states that when Gould was an Erie director, he bought 200 acres of anthracite land at Glenwood, fourteen miles north of Scranton, in the Lackawanna Valley. The deed was made out to him as trustee of the company, and the property is now valued at not less than $300,000. He kept the purchase dark till the land had been sold for taxes ; then he gave the company the deeds, and told the managers how he had gained possession of the land. A shaft was sunk and a breaker erected. The works were called the Hillside Coal and Iron Company. The Erie, which owned them, used the entire output of coal on its main line and branches. The purchasers under the tax claim then began a suit against the Hillside Company for the possession of the real estate, and the case is now on trial.

A second meeting of the Mine Commission appointed to revise the mine law affecting the anthracite regions, held at Wilkes-Barre, adjourned March 28th, after a three days' session, to meet in Pottsville on April 30th. The mine inspectors present were : J. E. Roderick, Hazleton ; Samuel Gay, Pottsville ; James Ryan, Ashland ; Robert Mauchline, Shenandoah ; G. M. Williams, Wilkes-Barre ; and P. Blewitt, Scranton. The executive committee reported having revised a portion of the law. The report was accepted, and a committee was instructed to continue the revision, in order that the work might be intelligently done. The commission has divided it into fifteen subjects for discussion at future meetings. Five of these subjects for consideration at the next meeting are : First, the title, preamble, and enacting clause of the new act ; secondly, surveys, plans, and maps ; thirdly, the adjustment of inspection districts ; fourthly, shafts, slopes, and outlets ; fifthly, ventilation. The committee meanwhile will prepare suggestions in relation to those subjects to be considered.

The water is now out of Girard colliery at Pottsville, but work will not begin for several weeks. Thirteen hundred gallons a minute were hoisted, and the water was 65 feet up the slope.

The Pennsylvania Diamond Drill Company has begun the boring for J. Langdon & Co.'s new Henry Clay No. 2 colliery at Shamokin.

Mr. F. D. Collins has leased 300 acres of coal land near Moosic, in Lackawanna township, from the Winton, Dean & Pennsylvania Anthracite Coal Company ; and also the coal-breaker known as the Coray breaker, owned by the company. Preparations for mining and sending coal to market will begin at an early day. The coal will be shipped over the New York, Susquehanna & Western Railroad.

While men were driving an air-way at the Morris Ridge colliery April 1st, a spring was struck, and the water flowed in so fast that the pumps were unable to gain a headway. The mine was inundated and work suspended. The loss will be heavy.

The issue of $1,000,000 of bonds by the Lehigh Coal and Navigation Company, which was disposed of to Drexel & Co., was a special mortgage, and the security is the same as that of the consolidated mortgage of the company. The sale of these bonds is solely for the purpose of providing for the floating debt of the company, which is slightly less than $1,000,000. The new bonds bear interes

at the rate of 4½ per cent per annum, and run for forty years. The Lehigh Coal and Navigation Company is engaged to-day in paying off that portion of the first mortgage loan amounting to $381,840, which it declined to extend. Of this amount, over $100,000 is in the company's sinking fund.

COKE.

The Connellsville Coke Pool Association met at Pittsburg March 28th, and advanced the price of furnace coke April 1st to $1.10 and foundry coke to $1.25 per ton. These figures, it says, are not high enough to justify it in carrying on business at a fair profit, and another advance will probably be made in a short time. It also decided to limit production by blowing out 15 per cent of all the ovens in the Connellsville region the first of the month, and the closing down of all ovens from Thursday until Monday each week. By this arrangement, it hopes to keep the supply within the bounds of demand, and thereby have no trouble in getting the price.

The coal and coke business about Latrobe is reported excessively dull. Bids are received by the Isabella Furnace Company for the erection of the Coketon crusher, destroyed by fire in January last.

The shaft of No. 2 of the Penn Gas-Coal Company, at Irwin, was discovered to be on fire March 29th. A short distance from the foot of the shaft, in the timbering of the roof, the fire had gained such headway that it was decided to flood the mine, and the neighboring brooks were turned into it. This flooding will require several days. The cause of the fire is a mystery.

VIRGINIA.

A meeting of miners and mine officials of Pocahontas has been held, at which a protest was adopted against the statement which has been sent out to the effect that the families of the entombed miners are not in need of assistance, and a committee and board of managers was appointed to solicit aid.

Many of the hands heretofore employed in the Pocahontas coal mines are leaving to seek work elsewhere.

WEST VIRGINIA.

Hon. Henry G. Davis, President of the Elk Garden Coal Company, has stated that this company has contracts for 500,000 tons of coal this year, and the output of the Elk Garden mines will be largely increased to fill the engagements. These contracts are for delivery in New York and New England.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

The following mineral patents have been promulgated since our last report:

ARIZONA.

PRESCOTT DISTRICT.

David Grubb *et al.*, Pine Tree and Cash lodes.

TUCSON DISTRICT.

Silver Moon Mining Company, Expert, Lola Lopez, and Mill-Site lodes. Anchor Consolidated Gold and Silver Mining Company, Anchor lode. Iula Gold and Silver Mining Company, Albatross lode. Charles McNamee, Mona lode. Dana Harmon, Thunderer, Mabel, and Congress of Beauty lodes, and Sigma Epsilon lode and mill-site. D. T. Harshaw *et al.*, Alta lode and mill-site. Buckeye Silver Mining Company, Buckeye lode. Henry J. Goodwin *et al.*, Dragoon lode. Centennial Silver Mining Company, Centennial lode. Howard Mining Company, Great Republic lode.

CALIFORNIA.

THE BODIE DISTRICT.

Mono Lake Hydraulic Mining Company, placer. Bodie Consolidated Mining Company and Mono Gold Mining Company, Burgess lode. Eleuterio Diaz, Alvah quartz mine.

MARYSVILLE DISTRICT.

Esperance Mining Company, Empire placer.

SACRAMENTO DISTRICT.

Deadwood Gold Mining Company, Deadwood & Railroad quartz mine. Robert H. Redd *et al.*, Alhambra quartz mine. Edward B. Bower, placer. Albion P. Whitney *et al.*, Sonoma quartz mine. Jerry Callan *et al.*, Big Chunk quartz mine. William K. White, Dodo River placer. Booth Gold Mining Company, Booth quartz mine. Milton Slocum *et al.*, placer.

STOCKTON DISTRICT.

Richard M. Haydock, Raw Hide placer. James G. Fair, Crystal lode.

COLORADO.

CENTRAL CITY DISTRICT.

John W. Blackburn *et al.*, Dana No. 2 lode. William Haywood *et al.*, Plato lode. R. S. Morrison, *et al.*, R. S. Morrison lode. Hoosac Mining and Milling Company, Maria Collins and Hoosac Extension lodes. Charles E. Bigelow *et al.*, Silver Ring lode. James H. Gardner, Gardner lode. Governor Group Gold Mining Company, Charter lode. A. Jackson *et al.*, Emancipation lode. Josiah W. Begole *et al.*, Tommy Foster lode. George W. McClellan *et al.*, Black Crook lode. Leadville & Pennsylvania Consolidated Mining Company, Sheldon lode and mill-site. Joseph W. Begole *et al.*, Begole lode. Anson P. Stephens, Hoosier lode and mill-site. John Mortha *et al.*, Howard lode. Isaac F. Roe *et al.*, Intermediate lode. Quartz Hill Gold Mining Company, Simmonds lode. Marcus S. Claypool, Bourbon County, Columbia, and Sub-Division lodes. Buda Mining Company *et al.*, Buda lode. John E. Morris, Minnesota lode. Jerome B. Chaffee *et al.*, Clift lode. Henry H. Tuttle *et al.*, Kenilworth lode. R. Harry Worthington, Muscovite lode. John L. Landis, Ben H. Hill lode. Alvin M. Richardson, Cincinnati lode. Harley B. Morse, Dead Broke lode. Homer F. Locke *et al.*, Aaron lode. Del Monte Gold and Silver Mining Company, Del Monte lode. Washington T. Lewis, Rothschild lode. Horace H. Atkins *et al.*, Altamont lode. Jacob J. Elliott, Maud Munroe lode and mill-site. Michael B. Graeff, placer. Lester E. Drake, Washington Extension lode. E. Tully Jones *et al.*, Meeker lode. Nonantum Gold and Silver Mining Company, British lode. Sidney W. Tyler *et al.*, George Wellington lode. B. F. George *et al.*, Center lode. John Best, Morning Star lode. William B. Stone, Mercer County lode. Charles C. Welch, Little Ella lode. M. V. B. Gillette *et al.*, Colfax lode and mill-site. Mann T. Redman, Sedali lode.

DEL NORTE DISTRICT.

James G. Hazard *et al.*, Rainbow lode.

DURANGO DISTRICT.

Nathaniel E. Slaymaker *et al.*, Emerald lode. J. H. Mountain *et al.*, United States Treasury No. 2 lode. E. J. Warner, Nevada placer. Floyd M. Goodykoontz *et al.*, Ashland lode. James C. Parrish, Melvina lode. James P. Wallace, Century lode. James M. Hopkins, Cortland, Progressive, and Rochester lodes. Jesse J. Crosswy *et al.*, Peerless and Queen City lodes. S. K. Beckwith, Carbonate King lode.

LAKE CITY DISTRICT.

Samuel G. Field *et al.*, Lewiston lode. John H. Maughan, Western Bell lode. Swan A. Johnson, Mountain Eagle lode. Emelie Costigan *et al.*, Chicago lode. Colorado Mining and Discovery Company, Vanderbilt lode. Belle of Ouray Silver Mining Company of Colorado, Way Up lode and mill-site. Waldron Consolidated Silver Mining Company, Buffalo and Silver lodes. James L. Hill, Great American and Blacksmith lodes. Frank W. Bonnie *et al.*, Contact lode. Henry M. McIntyre *et al.*, Maud S. lode. David Frakes *et al.*, Calumet lode. Joseph L. Cunningham, Wicker Extension lode. F. P. Dimpfel, Bourbon County lode. Otto Mears, Paff placer. Colorado Mining and Land Company, Elephant, Lake Park, Buell, and Flora Temple lodes. William S. Campbell *et al.*, Polar Queen lode. John Latimer *et al.*, Independence lode. George O'Bannon *et al.*, Fanny Fern lode. S. E. Caple *et al.*, Hoosier lode. E. A. Buell, Allen G. Thurman lode. Manhattan & San Juan Silver Mining Company, Edith lode. Palmyra Mining and Milling Company, Zenobia and Palmyra lodes. J. F. Steinbeck, Rip Van Winkle lode. Gold Run Mining Company, Big Galena lode and a placer. C. R. Fitch *et al.*, Cleveland lode. George W. Bailey *et al.*, Silver Star lode. Alfred Smith *et al.*, Hoosier placer. L. W. Balch, Mono lode. John S. Hough *et al.*, Shiloe, Gladiator, and Corinth lodes. Christopher Cogan *et al.*, Snow Bird lode. Frank Hiscock *et al.*, Gold and Silver Chief lode and mill-site. Charles H. Toll, Hyacinthe lode and mill-site. Pine Bluff Mining Company, Rob the Ranter lode.

LEADVILLE DISTRICT.

A. L. Spencer *et al.*, Gold Crown lode. Ashen Helen *et al.*, Great Eastern lode. L. J. Smith *et al.*, Houghton lode. Michael Sullivan *et al.*, Sedalia lode. John L. Pendery *et al.*, Belle of the West and Golden Curry lodes. Forest Queen Mining Company, Forest Queen lode. Henry McCabe, Eagle lode. Frank Brooks *et al.*, Pickwick lode. Edward Lowe *et al.*, St. Valentine lode. Joseph Reither, Carl Schurz lode. Kenneth L. Fahnestock, Blue Grass lode. Iron Silver Mining Company, Porphyry lode. Boreel Mining Company, Gonabrod lode. Frank Olsen *et al.*, Vega and Eagle lodes. Mathias Thompson, Best Hope, Finland, Patagonia, and Carondelet lodes. Daniel M. Hart *et al.*, Missouri and Laclede lodes. Charles N. Selser *et al.*, Transatlantic lode. John Harvey *et al.*, Unexpected lode. Henry F. Green *et al.*, Rob Roy lode. Professor Gold and Silver Mining Company, Professor lode. Charles F. Cuno *et al.*, Wild Ellen lode. William H. Stevens *et al.*, Iron lode. Frederick Lottes, Nellie placer. R. L. Nute *et al.*, Jerusalem placer. Howard Z. Culver, Gold Star and Kansas Chief lodes. William S. Stebbins *et al.*, Ben Butler lode. S. H. Elbert *et al.*, Silver Star lode. Patrick Scanlan, St. Louis lode. David F. Miller, Putnam lode. James Spruhan *et al.*, Weyand lode. Wimer Bedford *et al.*, Town Talk lode. Austin Stevens, Black Tiger lode. William L. Graham *et al.*, Eclipse lode. Cave Silver Mining Company, Cave lode. Charles H. White *et al.*, Parole lode. S. L. Morris *et al.*, Bledsoe lode. J. P. Brounscombe *et al.*, Wyoming Valley placer. Anson Sperry (trustee) *et al.*, Silver King lode. A. Mayfield *et al.*, Grand Prize lode. William S. Ballou *et al.*, Tom Scott lode. Mount Bross Mining Company, Dennison lode. A. W. Anderson *et al.*, A. W. Anderson lode. P. J. Cunningham, Fannie Gage lode. Frederick C. Ewing *et al.*, Winona lode. Byron E. Shear *et al.*, Mountain Ranger lode. L. H. Wilmot *et al.*, Mary and Resurrection lodes. Thomas Weir *et al.*, Tonawanda lode. Chrysolite Silver Mining Company, All Right and Kit Carson lodes. Ballard Mining Company, Mountain Daisy lode. John A. Smith *et al.*, Toronto and Memphis lodes. Thomas B. Mason *et al.*, Black Bird lode. Queen Mining Company, A. B. lode. Ballarat Mining Company, Belle of the Hills lode. Little Corinne Consolidated Mining Company, Little Corinne lode. H. R. Calkins *et al.*, Heckly lode. Samuel B. Morgan, Neptune lode. Roxabell Consolidated Mining Company, Roxabell, Eldorado, Ontario, and Banning Fissure lodes. Thunderbolt Consolidated Mining Company, Globe, D. C., Emma, Sherman, Thunderbolt, and H. M. lodes. Crystal Gold and Silver Mining and Milling Company, Vandemoer lode and mill-site. L. A. Kent *et al.*, Little Todd lode. E. D. Messinger *et al.*, Logos lode. D. C. Metsker *et al.*, Chicago, Flint, and Mary F. lodes and Fannie B. lode and mill-site. Nestor Mining Company, Robert Keeley lode. William H. Eaker *et al.*, Myron lode. Charles H. Riggins, Alhambra lode. Jerry Collins *et al.*, Australian lode. Marian Consolidated Mining Company, R. A. M. lode. Clinton Reed, Crown Point lode. John M. Masterton *et al.*, Yellow Jacket lode. Nathan Eisendrath, Ryan lode. R. R. Loomis *et al.*, Mammoth lodes. A. M. Lyon, placer. Meily Mining Company, Crystal and Good Hope lode. Orrin Skinner *et al.*, Tribune lode. John J. Page *et al.*, William Wallace lode. Crystal Lake Gold and Silver Mining and Milling Company, Little Emma lode. Edward E. Floyd *et al.*, Thespian lode. David M. Hyman, 1001 lode. Antelope Mining Company, Deer lode. J. L. Graves *et al.*, Mocking Bird and Missouri Boy lodes. Finla McClure *et al.*, Star of the West lode. S. M. Logan *et al.*, Logan lode. W. H. Kingsbery *et al.*, Topliff, Lincoln, and Mountain Elk lodes. Joseph B. Keeler *et al.*, Amity lode. Richard H. Parmele, Rock Island lode. Mary J. Stewart *et al.*, Eclipse lode. Ready Pay Gold and Silver Mining Company, Ready Pay lode. Fulton Mining Company, J. C. Johnson lode. A. P. Curry *et al.*, Colonel Curry and Golden Ledge lodes. D. D. Bliven *et al.*, Little Hattie lode. Alps Consolidated Mining Company, Helvetia lode. David M. Hyman, Mose lode. A. H. Estes *et al.*, Ketsby lode. Edward B. Weare *et al.*, Birthday lode. F. R. Miller *et al.*, Lake View lode. F. Meredith Jones, placer.

PUEBLO DISTRICT.

Wallace Ward *et al.*, Orange and Lucy Long lodes. John W. Bailey, Sierra Mohada lode. Christian Wahl *et al.*, Hudson Bay lode. Gustav C. Dehle *et al.*, Bulldozer lode. Bassick Mining Company, Georgie lode and Lookout mill-site. Sarane Mining Company, Little Lily, Justice, and Argo No. 2 lodes. Belle Mining and Milling Company, Belle of the Gulch lode. Edward A. Hilburn *et al.*, Revilee lode. William H. Hyde *et al.*, Ocean Wave, Yellow Jacket, and Pueblo lodes. St. Domingo Mining and Milling Company of Fremont County, Colorado, Montezuma lode. Lorenzo G. Coombs, *et al.*, Orion lode.

DAKOTA.

DEADWOOD DISTRICT.

S. P. Romans, Empire State and Trojan lodes. John Oleson *et al.*, Silver Terra and Grand View lodes. Newton Learned, Gilt-Edge, Black Dan, Highland Mary, and Specie Payment lodes. Washington Consolidated Gold and Silver Mining Company, Washington and Little Living lodes.

IDAHO.

BOISE CITY DISTRICT.

James B. Haggin, Wallace Fraction lode. Robert C. Chambers *et al.*, O. K. lode. Warm Springs Consolidated Mining Company, Ontario and North Star lodes.

OXFORD DISTRICT.

John Tiernan *et al.*, Robinson lode and mill-site. John T. Gilmer *et al.*, Juliet lode.

MONTANA.

HELENA DISTRICT.

Augustus P. Van Dusen *et al.*, Edith May lode. William Ousley *et al.*, Tom Haney lode. William McDermott *et al.*, Silver Bell and Sun Dorg lodes. Charles S. Warmer *et al.*, Henriett lode. Charles X. Larrabee, Greenleaf lode.

Charles H. Carver *et al.*, California lode. George C. Fitcher *et al.*, Prospect lode. Alexander J. Leggat, Wasego lode. Peter F. Sherr *et al.*, Chief Joseph lode. Peter McMahon *et al.*, Emily and Mill View lodes. Henry C. Kessler *et al.*, Autocrat and Plutonian lodes. Silas F. King *et al.*, Northern Butte lode. George W. Cleveland, Aqua Frio lode. John H. Curtis *et al.*, Grand Junction lode. John S. Roberts, Great Western lode. Thomas H. Hay *et al.*, Last Chance lode. Thomas Ford *et al.*, Robert Emmet No. 2 lode. Roderick D. Leggatt *et al.*, Craig lode. Salton Cameron *et al.*, Plover No. 1 lode. Charles S Warren *et al.*, Bland lode. William W. Prouse *et al.*, Elvina lode. John F. Forbis *et al.*, Montgomery lode. John T. Argyle *et al.*, Findling lode. Joseph P. Flick *et al.*, W. A. Alley lode. James Saveny, Atlantic Cable Extension lode. John Brannagan *et al.*, Snow Drift lode. Armistead H. Mitchell *et al.*, Zadock lode. Michael McNamee *et al*, Elm Orlu lode. Charles P. Hough *et al.*, Crœsus lode Erastus A. Nichols *et al.*, Speculator lode. O'Dillon B. Whitford *et al.*, Wanderer lode. James H. Halford, General Custer lode. William Thompson *et al.*, Carrie lode. Thomas Daly *et al.*, Fisher lode. Adam Faraday *et al.*, Flag Staff lode. Edward W. Knight *et al.*, Black Alder lode. Charles D. McClure, *et al.*, Goldsmith No. 2 lode.

NEVADA.

EUREKA DISTRICT.

Morris H. Joseph *et al.*, Water-Jacket lode. Commonwealth Consolidated Mining Company, All Alone lode. M. L. Cansey, Burning Moscow lode. Eugene N. Robinson, Eugene N. Robinson lode.

NEW MEXICO.

LAS CRUCES DISTRICT.

Robert Swan, Josephine and North Extension Volcano lodes. Homestake Mining Company, of White Oaks, New Mexico, South Homestead lode. William M. Pierson, R. E. lode.

UTAH.

SALT LAKE DISTRICT.

Isaac S. Waterman, St. Patrick lode. Edward P. Ferry, Huron, Woodside Extension, Tenderfoot, Virginia, and San Joaquin lodes. Edward P. Ferry *et al.*, Arms lode. Helene Ferron *et al.*, Missouri and Patrick Henry No. 2 lodes. John Q. Packard, Zulu and Valley lodes. Moylan C. Fox *et al.*, Shoo Fly lode. John Sharp, Jr., Golden Era and Granite lodes. Ina C. Kennelly *et al.*, Finance and Poland lodes. Richmond & Teresa Mining Company, Richmond lode. Samuel Levy *et al.*, Roaring Lion lode. Mineral Fort Mining and Smelting Company, Venus lode. James Lindsay *et al.*, Montezuma lode. James R. Schupbach *et al.*, Black Diamond lode. William S. Searles *et al.*, Oneida lode. Edward L. Preston *et al.*, Pickwick lode. Robert C. Ctambers *et al.*, Little Kate lode. William Slater, coal. Michael Hegarty *et al.*, Hope lode. John M. Fallon *et al.*, Wild Bob lode. David C. McLaughlin *et al.*, Nettie lode.

WASHINGTON.

OLYMPIA DISTRICT.

Robert L. Thorne, coal. David T. Denny, coal. Ocean F. Cosper, coal. Charles F. Munday, coal. Robert E. Finley, coal.

WYOMING.

CHEYENNE DISTRICT.

William Bradley, Bradley lode and mill-site.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

NORTH STAR.—Sixteen tons of ore were recently received at the Tombstone Mining and Milling Company's smelter at Charleston from this mine in Arivapai Cañon. The ore will probably assay from 50 to 60 per cent lead and $40 or $50 in silver. The shipment is made to determine its quality for smelting. If favorable, works will be put up at the mine.

GRAHAM COUNTY.

ARIZONA COPPER COMPANY.—Messrs. Fraser & Chalmers, of Chicago, have already shipped 60 tons of machinery for this company's new plant, and 50 tons or more will probably be shipped very shortly.

ARKANSAS.

The mines at Bear Mountain, fifteen miles west of Hot Springs, are exciting considerable interest. A number of assays have been made and show the ores rich in silver and gold. A stamp-mill has been erected, and the country has been laid out in claims for a distance of twelve miles. Miners are flocking in, property is changing hands, and a boom seems imminent. The camp is greatly interested in remarkable discoveries made in a place called Old Spanish Hole.

CALIFORNIA.

MODOC COUNTY.

MODOC.—The different mines of the company are worked, and ore is hauled to the furnace, which was to have started up April 2d, for a run of at least forty days.

PLUMAS COUNTY—GREENVILLE DISTRICT.

ARCADIAN.—Work has begun in getting the mill ready for starting. All through the winter, a number of men were at work in the mine, and a large body of ore is opened up.

SOUTHERN EUREKA.—The mine is at a stand-still, and is in charge of a keeper appointed by the constable. It is confidently expected that the existing difficulties will soon be settled.

SAN BERNARDINO COUNTY.

BONANZA KING.—Reports state that recently some very rich developments have been made in some unexpected places in the mine. The lowest working is at the depth of 547 feet, and the appearance of the ore at that depth is improving. A 12-foot vein of considerable richness has been discovered in the fourth level back of what was considered the foot-wall of the ore zone. The mill has been running regularly.

SIERRA COUNTY.

SIERRA BUTTES.—Twenty stamps of the new forty-stamp mill have begun crushing ore from No. 8 tunnel. The other twenty stamps will not be ready for operation before June.

CANADA.

PROVINCE OF BRITISH COLUMBIA.

A correspondent of the Toronto *Globe*, writing from Victoria, says that experienced miners and prospectors report valuable mineral deposits of gold, silver, copper, iron, coal, and other ores in the regions they have visited. The cost of transporting provisions into the interior of the country has hitherto prevented the rapid development and location of mining camps. The opening of the railroad to the summit of the Rockies on the east and to the head of Kamloops on the west will now have the effect of stimulating the mining industry to a wonderful degree. Already extensive preparations are making by miners and prospectors in this city to proceed to the mountains as soon as the state of the weather will admit of their so doing. The local legislature at its recent session amended the mining laws. They are pronounced by miners to be liberal, and such as the country wants. By the terms in the Settlement Bill, the Dunsmuir railroad syndicate, as already announced, received a grant of a tract of land estimated at nearly 2,000,000 acres, in addition to the $750,000 in cash. The arable and pastoral lands within this reserve are to be sold to *bona-fide* settlers at $1 per acre. Each locatee, however, can claim no more than 160 acres. The island is said to contain a considerable amount of fair agricultural land, but not in large areas *en bloc*. The construction of the railroad from this city to Nanaimo will open up this island, when it will be found that much of the land that is now regarded as of but little value will prove to be fertile and capable of sustaining a large industrial population. It will increase rapidly in price, as both at Victoria and Nanaimo will be found markets for all the products of the farms. Mineral and timber lands within this reserve will be sold by the syndicate at the uniform price of $10 per acre, free from all reservations or conditions whatever. The sale of these lands will be under the control of the local government for the next four years after the passage of the Settlement Bill at Ottawa. The proceeds of such sales as are made will be handed over to the syndicate as the construction of the road progresses. The head office of the company will be in Victoria. The terms of payment will be 25 cents per acre on allocation and the remaining 75 cents in three equal annual payments.

PROVINCE OF QUEBEC.

Mr. William Mackintosh, manager of a phosphate mine near Buckingham, who was recently examined in the geological survey in regard to the phosphate mines of the country, stated that there are large deposits of this mineral in the vicinity of Kingston and Ottawa, and considerable capital and a large number of laborers are employed in conducting operations. The most valuable deposits are in the vicinity of Buckingham, where there were a number of large mines, employing nearly 300 men, and turning out nearly 14,000 tons yearly. The phosphate is all sent in a raw state to Europe at a cost of $7 per ton for transportation, to be there manufactured into fertilizers.

COLORADO.

CLEAR CREEK COUNTY.

FREELAND.—A rich strike has been made in the lowest level of this mine.

MOLINE.—The resumption of work at this tunnel is the latest news.

CUSTER COUNTY.

BULL-DOMINGO.—A telegram from the superintendent states the winze is down 72 feet—ore all the way. The management intends to sink 100 feet on the ore-body before beginning to extract for the mills.

DOLORES COUNTY.

MARRS CONSOLIDATED.—The Rico *Record* says that Messrs. Marrs, Middleton, Crooke, and Taylor have brought suit against Newman, Chestnut & Stephens to recover $500,000 damages, claiming that the Newman group of mines was purchased by them under misrepresentation of the owners, said Newman, Chestnut & Stephens. This rich group of mines, now being in litigation, may possibly be idle for a time. The manager is awaiting instructions from headquarters whether or not to continue operations.

GILPIN COUNTY.

CALIFORNIA.—In the 1300-foot west level of the Hidden Treasure, a good body of ore has been struck in development of the vein at that point. Also, in the main or Standley shaft, mill ore is taken out that averages 7 ounces of gold per cord. At the 1400foot east level, another large body of ore has been passed through. Sinking is continued, and it will not be a long time before the depth of 1600 feet will be attained, when other levels will be driven.

HORSESHOE.—It is rumored that this company will soon resume work upon its property below the mouth of Excelsior Gulch, Russell District. It owns what is known as the Mattie May and several veins north. A cross-cut north from the gulch will be driven, which, if continued on to and under the summit of the mountain, will strike the Golden Wedge, Vincent, and Nottaway at a depth possibly of 340 feet.

RARA AVIS.—Work has been resumed in the main shaft of that property on the Whitney mine, Prosser Mountain.

GUNNISON COUNTY.

The new smelter at Gunnison is rapidly approaching completion, and would now have been in operation had the weather been more favorable. The furnace is a combination of the water-jacket and reverberatory. Raw coal will be used for fuel, and this additional experiment in practical smelting adds renewed interest to the enterprise.

HINSDALE COUNTY.

The indications now are, that by June the Crookes Company will be working a large force and producing 3000 tons of ore a month, and that the Capital City Company, Independence, Big Casino, Belle of the West, Frank Hough, California, Vermont, and other producing mines will be yielding heavily.

LAKE COUNTY.

The Leadville *Herald* has the following:

ADAMS.—Despite the great expense the company has been to in battling with water in both the Brookland and Clontarf shafts, and the vast amount of exploration and development-work done, the property for months past has paid more than expenses, and at the same time has opened up large ore-bodies.

HARRISON.—The reduction-works have at present stacked on the premises more ore than they have ever had on hand at one time, with a single exception. All the ore-bins at the works—and they are more numerous than they were a year ago—are filled with ore. The establishment, however, notwithstanding its 12,000 tons of ore on hand, is a little short of lead ore. In consequence of this deficiency, only three furnaces are in blast. Manager Fobr does not express any anxiety on this score, and believes that, with the opening of the Red Cliff road, the market will be well supplied with this class of ore.

HENRIETT.—About forty tons of ore are daily produced, mostly from development-work, no stoping of consequence being done. Working under this system, the resources of the mine have been on the increase daily, and the Henriett shows very large bodies of ore. The incline from the bottom of the Harker shaft has advanced along the vein for almost 800 feet, and leaves the face only 125 feet from the east end side-line of the claim. Throughout all these developments, the mine shows vast bodies of sand and hard carbonate ore, averaging ten dollars per ton above the cost of smelting. The pumps in the lower incline, notwithstanding the suspension of pumping in neighboring mines, are holding down the water and enabling work to advance and permitting the development of the lowest ore-deposits of the property.

MORNING STAR.—The company, now that the smelters' regulations have been abolished, will solicit bids, and doubtless resume work with a full force and make a large production of its desirable smelting ore.

SILVER CORD.—The mine will continue operations and the present working force will be retained and no material change made in the output of the mine. The production will probably be greatly increased. This settlement of the controversy between the Silver Cord mine and the smelters is the best news the

stockholders have received for a year or more past. The Arkansas Valley, the La Plata, the American, and the Manville presented bids.

VIRGINIUS.—The lessees of this mine, on Little Ellen Hill, are shipping 16 tons of ore a day. The mineral is reported to average 24 ounces in silver, four tenths of an ounce in gold, and 32 per cent in lead. A very large body of ore is in sight in the mine.

PARK COUNTY.

FANNY BARRET.—W. A. H. Loveland, president of the company, has recently been in New York arranging for a large amount of development on that property. It is probable that at an early day the working force will be increased and the work of deepening No. 2 shaft will be pushed vigorously and possibly to a depth of 500 feet. This shaft is down 104 feet, and is connected with No. 1 shaft, 500 feet distant, by a level run at 50 feet. These openings have all produced ore. The object in sinking to the depth mentioned is to penetrate through the quartzite in the expectation of finding the vein or contact, whichever it may be, less pockety than above.

PUEBLO COUNTY.

COLORADO SMELTING COMPANY.—This company is erecting four roasting-furnaces and making many other improvements at its works at Pueblo.

NEW ENGLAND & COLORADO.—The ground for the plant was broken March 26th. All the necessary arrangements for laying the railroad track to the site of the new smelter have been made, and the other work will also progress speedily.

SUMMIT COUNTY.

In the Holy Cross District, the Gold Park Company is again to come to the front. The Rupp mill is to start up. One or more Howland pulverizers are to be put in, and other new outfits are to operate more or less extensively.

ROBINSON.—The Leadville *Herald* is authority for the statement that a valuable strike of fine ore has been made in this mine. The mineral was found in a chute distinct from the old ore-body, and consists of oxidized ore of good grade.

DAKOTA.

FATHER DE SMET.—The superintendent's report for the week ended March 22d shows ore extracted from the first, second, and third levels, 2020 tons. Ore milled, 1975 tons. Golden Gate south header, third level, advanced 6 feet. Header in 103 feet.

GUSTIN BELT.—Boston capitalists have purchased the controlling interest in this company. The hoisting-works at the Boston mine, on Whitetail, have been purchased, and the work of placing them at the Gustin Belt will begin at once. Arrangements will be perfected at an early date to thoroughly develop and work that property in the way of other essential improvements.

HOMESTAKE.—It is stated that this company intends to buy the Alaska mine, which adjoins its property.

ST. ELMO.—Work at the mine and mill will be resumed in April.

GEORGIA.

Messrs. Clement, Bane & Willoughby, of Chicago, and Dewar & Siddall, of Philadelphia, it is said have formed a syndicate and purchased 5000 acres of marble quarry land on the Marietta & North Georgia road. They will put 2000 men to work on it, and introduce Georgia marble into all markets of the world. These persons represent several millions of dollars. They have applied for a charter under the laws of Georgia.

LUMPKIN COUNTY.

Every thing in and about the numerous mines in this county indicates prosperity, and the general condition was never more favorable. It is probable that two or three new mills will be erected during the present season, and that an increase in the capacity of some of those already at work may be looked for shortly.

IDAHO.

Reports from London, England, state that an organization known as the Bullion Mining Company has been formed there, with a capital of $1,100,000, divided into shares of $5 each, to purchase the Bullion-Ophir group of mines, at Bullion, near Hailey. The experts last summer examined the property on behalf of the purchasers. Since that time, they have been steadily developed, and now show a much larger quantity of ore than ever before. This sale, says the local press, will mark a new epoch in the history of Wood River. During the past two years, the Muldoon sold for $100,000; the Narrow Gauges for $80,000; the Silver King for $125,000; the Mayflower for $375,000; the Minnie Moore for $500,000, etc.

Greatly exaggerated reports continue to come from the Cœur d'Alène region. A dispatch from St. Paul, Minn., says that State Senator Griggs has just returned from this region, and states that the yield of gold the coming season will be extraordinary. One miner, who, a few weeks ago, was too poor to buy his own outfit, has taken out $5000 worth from a place six feet square. Another has sold a quarter of his claim of five acres for $10,000 cash. A miner at Rathdrum has sent $1200 in gold to the United States Mint; he showed three nuggets worth $167. The merchants at Spokane Falls have taken in $40,000 from the miners in exchange for supplies. A few of the placers are working, but on most of them there are from two to twenty feet of snow. The snow, however, is melting rapidly, and the miners who are working take out $40 a day per man. The men who jumped the "widow's" claim last fall, while fighting the matters in the courts, have taken out $18,000. There are 5000 men in the mines, and their claims can not be bought. Many sit with gun in hand watching their claims. People are flocking into the mining region at the rate of one hundred a day. At Thompson's Falls, over one hundred buildings were erected in two weeks.

MICHIGAN.

HANCOCK.—It is rumored that this mine will stop work in May next. This will affect the Lake Superior Native Copper-Works, as the mineral from the Hancock mine has been smelted there, and when that stops, these works will then only have the smelting of the mineral from the Wolverine and Grand Portage. The furnaces are now only run three days on the mineral supplied by the three mines, although the fires are kept up continually.

ROPES.—A good share of the stock which this gold and silver mining company proposes to sell, to enlist more capital in the project of developing the property, has been taken, and the remainder will be disposed of in time to admit of an early resumption of mining and milling work there this spring.

MONTANA.

SILVER BOW COUNTY.

CABLE.—During the past few months, the mine has been thoroughly timbered, and is now in splendid shape for continuous operation. On the 300-foot level, drifts are extending that have opened up vast ore-supplies, the extraction of which, on a large scale, will soon begin. The mill will be fired up in about two months, and will thereafter run uninterruptedly.

GAGNON.—This mine some months ago was purchased by the Colorado Smelting Company. The extraction of ore was then temporarily suspended, and the sinking of the main shaft to the 600-foot station was begun. That depth has now been reached, and a cross-cut started south which has tapped and intersected the ledge to the hanging-wall. It exposes between regular and well-defined walls thirty feet of concentrating ore, carrying about twenty ounces of silver, six per cent copper, and a heavy proportion of iron occurring as a pyrites mixed with siliceous gangue matter. The peculiar character of this ore renders it singularly easy of concentration, which readily adapts it for furnace reduction. Experiments show that five tons can readily be reduced to one that would assay about 75 ounces in silver and 12 per cent copper.

MONTANA.—The smelter has facilities for treating 125 tons a day. It has five matting furnaces and one blast-furnace. The erection of still more is in contemplation.

PARROT.—The concentrating facilities are said now to be perfect, and the number of furnaces has been so increased that 80 tons of ore a day are reduced. It averages 20 per cent copper. The company mine was never before in such good shape to insure a constant and heavy production. The ore output is 110 tons a day, two thirds of which are put through the concentrators. An additional matting-furnace will soon be erected, which will increase the daily smelting capacity to fully 100 tons

PYRENEES.—The mine and mill are running as usual, and at a profit. It is believed, however, says the Butte *Inter-Mountain*, that the sale of the property has fallen through.

NEVADA.

ELKO COUNTY.

NAVAJO.—Milling operations, and work at the different points in the mine, have been resumed.

ESMERALDA COUNTY.

MOUNT CORY.—The first shipment of bullion has been made. It consisted of 14 bars of silver and gold bullion, weighing 1740 pounds, and valued at $20,729.90. When the fact is taken into consideration that the work so far done at the mill has mainly been experimenting, and adjusting the numerous pieces of machinery, this shipment is a large one. Every thing is in fine condition, and there will be no delays other than those of a nature to be expected in so large a mill. From this time on, regular shipments will be made. The bullion is 800 fine, thus proving beyond a doubt that the leaching process is the best that could have been adopted, as it was predicted that, an account of the character of the ore, it would not be possible to get it more than 600 fine. The mine is looking well, and new developments of ore are continually made. The base slag, consisting of copper and lead, and carrying silver, will be allowed to accumulate at the mill until there is enough to make a car-load, and no shipments of less than that amount will be made.

NORTHERN BELLE.—The property of this company was offered for sale, in parcels, by Deputy United States Marshal Rickets, on a judgment in favor of the Holmes Mining Company. There being no other bidders, it was sold as follows: The mines and hoisting-works at Candelaria, for $160,000, and the mills and real estate at Belleville, for $150,000. The personal property was sold March 1st, 1884, for $20,000, all bought in by the Holmes Mining Company.

EUREKA COUNTY.

BOWMAN.—The syndicate of Boston capitalists which owns this and several other mines in Eureka District, sent out one of its own number, Colonel Wiley, to look into the condition of the property. This gentleman is said to be so well satisfied with the outlook that he will advise the expenditure of $100,000, if necessary, for the prospecting and development of the mines.

EUREKA TUNNEL AND MINING COMPANY.—According to the *Sentinel*, the company's affairs are not in a very flourishing condition, and it looks as if the property would pass into the hands of some of the judgment creditors, whose claims amount to about $68,000. The property was sold some five months ago, under the judgment of the White Pine County Bank and preferred claimants, and was bought in by Messrs. Sadler, Pardy, Muller, and Capron for some $12,000. The time for redemption expired on the 29th of March.

STOREY COUNTY—COMSTOCK LODE.

SUTRO TUNNEL.—Report of progress and details of work from March 8th to March 22d, 1884: Main Tunnel—Since last report, general repairs have been made between points 14,400 and 14,600, 1200 and 2300, and 13,900 and 14,000. East of point 14,100, new sets of timber have been put up for a length of 27 feet, and east of point 14,500 new sets, a length of 38 feet 6 inches, and west of same point for a distance of 9 feet and 6 inches. From 14,100 to 14,800, guard plank have been placed alongside of track, and west of 14,400, 150 new covers placed on drain-boxes. Forth Lateral—Sub-drain in this tunnel has been excavated a distance of 80 feet and 4 twenty-foot boxes placed therein. New sills have been placed under track for same distance. The following temperatures were observed: Tunnel entrance, air, 52; water, 111; shaft, No. 1, east, 85; west, 86; shaft No. 2, east, 95; west, 45; shaft No. 3, 86; shaft No. 4, 72; Combination shaft connection, 60; Osbiston shaft connection, 98; C. & C. shaft connection, 80; Julia shaft connection, 90; Yellow Jacket shaft connection, 90; Forman shaft connection, 84. Flow of water, in standard gallons, per day, 9,683,800.

NEW MEXICO.

The Santa Fé smelter, which was about ready to blow in, was burned on the night of March 26th, including one of the finest chemical laboratories in the West, ten car-loads of coke and coal, and 100 tons of copper and silver ores. The fire was incendiary. Loss, $35,000; insured. J. D. Allan, of Santa Fé, and J. M. Allan, of Chicago, were the principal owners. It will be rebuilt at once on a larger scale.

PENNSYLVANIA.

Press dispatches state that a silver lode has been discovered on the arm of Sylvester Delaney, at South Canaan, Wayne County. Samples of the ore were recently assayed in Philadelphia, and they yield about $40 a ton, which will repay the work of development. The Camden Smelting Company has contracted to build a crusher at Camden, N. J., to which place the product of the lode will be shipped for smelting.

UTAH.

At the annual meeting of the Salt Lake Mining Institute, held in Salt Lake City, the following trustees were re-elected: Messrs. Reno, Baskin, Bredemeyer, Godbe, and Nichols. The following are the officers of the Institute: J. E. Clayton, President; O. J. Hollister, Secretary; E. Austin, Treasurer; and these, together with J. R. Nichols and W. S. Godbe, form the executive committee. The secretary's report shows that an effort was made to secure aid from the territorial treasury at the late legislative session; but it was checkmated by a proposal to tax the mines, which the officers of the Institute opposed, and so the matter dropped. The life of the Institute must depend on the public spirit of the comparatively few until it can be made self-sustaining. It has been generously received and kindly supported so far, especially by the business and mining men of Salt Lake City. It enters upon the opening year with very fair prospects of lasting usefulness.

VERMONT.

ELY.—The engine and boiler-house of this copper mine were burned April 1st. The engine and machinery cost over $100,000 two years ago. It is thought the engine and boiler are not wholly lost. The building's foundation was wholly destroyed. The fire was probably incendiary. No insurance.

WISCONSIN.

PINE RIVER.—This mining and exploring company has been organized with a capital stock of $500,000, for the purpose of developing a property located on Pine River, Florence County.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, April 4.

Business and prices seem to be on the decline in the mining market, this week's transactions being very tame and confined almost to a few stocks. Standard was the chief item of interest on account of its weakness. It suffered a very heavy decline, and closed to-day at its lowest figure. Hall-Anderson was very largely dealt in, but its price was not as strong as last week. The Comstock shares were quite weak, although but very moderately dealt in. Sonora shows up with a very large number of transactions, but with no material change in price. We give a complete summary of the market below. The total number of shares sold aggregates 78,130, as against 88,036 last week.

The Comstock shares were very quiet and sold at weak prices. California was quiet and weak, selling from 5@2c. Consolidated Virginia was also weak, selling from 10@4@5c., assessment unpaid ; it was moderately active. Sierra Nevada declined from $2.75@$2 35, under a small business. Union Consolidated was moderately dealt in at weak prices ; it sold from $2.80@$2.50, assessment paid, and at $1.35 assessment unpaid. Mexican sold at $1.35, and Ophir at $1.15. Sutro Tunnel was very quiet, and sold at steady prices ; it was quoted from 15@14c.

The Bodie stocks were but moderately dealt in, and were on the decline. Standard was fairly dealt in, but suffered a very strong decline ; it sold from $2.65@$1.25. Bulwer was also weak, declining from $1.40@$1.10 under a small business.

The Leadville stocks were rather quiet and sold at about steady prices. Chrysolite was very quiet and recorded no change from last week's prices ; it was steady at 82@85c. Hibernia sold at 5c. Breece was steady, selling from 25@30c., under a fair business. Iron Silver sold from $1.25@$1.20 under a small business. Leadville was quiet and steady, selling from 41@45c. Little Chief sold at 51c.

The Tuscarora stocks were quiet and steady. Argenta sold at 21c. Belle Isle sold from 25@35c., assessment paid, and at 15c., assessment unpaid. Navajo was a little weak under a small business, selling from $2.80@$2.75.

In the miscellaneous list, Alice was quiet and steady, selling at $2.40. Eureka Consolidated sold at weak prices under a small business ; it declined from $4.25@$4. Green Mountain was fairly dealt in at stronger prices ; it sold from $1.95@$2.10. We hear that the tunnel (No. 6) in this mine last week struck into a new body of ore which, it is reported, surpasses in quality and quantity any former developments of the upper levels. The 60-stamp mill will start up on the 5th inst. with ore from the tunnel and uprise.

Hall-Anderson seemed to be on the decline, and was a little weak under a very active business ; it sold from $1.55@$1.45@$1.50. Horn-Silver was moderately active, and sold at strong prices ; it was quoted from $7.50@$8@$7.45. Robinson was very quiet at steady prices, selling at 20c. Bonanza King records but one small transaction, and that at $10.13.

Barcelona was quiet and steady at 13c. Central Arizona was a little weak under a small business, selling from 21@19c Decatur sold at 2c. Durango was quiet and steady at 5c. Eastern Oregon sold at 4c. and Harlem at 5c. Lacrosse was moderately dealt in at strong prices, selling from 13@15c. Rappahannock sold from 18@17c., with a small business. Sonora Consolidated was very actively dealt in at steady prices ; it sold from 5@7@6c.

MEETINGS.

The Copper Queen Mining Company, Nos. 37 and 39 Wall street, New York City. Annual meeting of stockholders for the election of trustees, April 14th, between twelve and one o'clock P.M.

The Small Hopes Consolidated Mining Company, No. 92 Broadway, New York City. Annual meeting of stockholders for the election of trustees, April 12th, at two o'clock P.M.

DIVIDENDS.

The Bodie Consolidated Mining Company, of California, has declared a dividend of fifty cents a share, payable April 5th.

The Bonanza King Consolidated Mining Company, of California, has declared dividend No. 5 of twenty-five cents a share, payable on the 15th inst.

The Cambria Iron Company, of Pennsylvania, pays a dividend this month.

The Copper Queen Mining Company, of Arizona, has declared a quarterly dividend of one hundred thousand dollars, payable April 18th.

The Diamond Coal Company has declared its usual quarterly dividend, payable this month.

The Nescopec Coal Company has declared a quarterly dividend payable this month.

The Paradise Valley Mining Company, of California, has declared dividend No. 2 of ten cents a share, payable at San Francisco, March 20th.

The Pennsylvania Steel Company has declared a dividend payable this month.

The Plymouth Consolidated Gold Mining Company, of California, has declared its regular monthly dividend (No. 11) of fifty cents a share, payable on demand. Total amount of dividends to date, $550,000.

The Rooks Mining Company, of Vermont, has declared dividend No. 1, of seventeen cents a share, payable at Boston, April 15th.

The Security Land, Mining, and Improvement Company has declared a quarterly dividend of two and one half per cent on the capital stock, payable at Philadelphia, Pa., April 1st.

The Syndicate Mining Company, of California, has declared a dividend of ten cents a share, payable on April 5th.

The Westmoreland Coal Company, of Pennsylvania, has declared a dividend, payable in April.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS.					
	Mar. 28.	Mar. 29.	Mar. 31.	April 1.	April 2.	April 3.
Albion	..	..	..	..	..	..
Alpha	..	..	..	..	..	..
Alta	1½	1½	1⅝	1⅝	1½	1⅜
Argenta	..	..	..	..	..	..
Bechtel	..	..	..	..	..	..
Belcher	..	1	1¼	1⅛	1⅛	1
Belle Isle	..	..	..	..	..	..
Best & Belcher	2½	2⅝	2½	2½	2⅜	2⅜
Bodie	7½	7	6½	6⅜	6¼	5
Bullion	..	..	..	..	..	..
Bulwer	..	..	..	..	..	..
California	..	..	..	..	..	..
Chollar	1¼	1¼	1¼	1⅛	1⅛	1¼
Con. Pacific	.45	.40	..	.35	.35	..
Con. Virginia	.10	.10	.10	.10	.10	.10
Crown Point	1⅜	1½	1¾	1½	1⅝	1½
Day	..	..	1¾	1¾	1¾	2
Elko Cons	..	..	..	..	..	..
Eureka Cons	4	4¼	..	4¼	4⅛	4⅛
Exchequer	..	..	..	..	..	..
Gould & Curry	1¼	1⅛	1⅛	1⅛	1⅛	1⅛
Grand Prize	..	..	..	..	..	..
Hale & Norcross	1¼	1⅛	1¼	1¼	1¼	1¼
Independence	..	..	..	..	..	..
Martin White	..	..	..	..	..	.60
Mexican	1⅝	..	1⅝	1½	1⅜	1⅜
Mono	..	..	..	..	..	..
Mount Diablo	..	..	2½	..	..	2⅝
Navajo	2½	2½	2½	2⅝	2¾	2½
Northern Belle	..	..	..	..	..	..
North Belle Isle	..	..	..	..	..	..
Ophir	1½	1⅝	1½	1⅛	1	1⅛
Overman	..	..	..	..	..	..
Potosi	.75	.80	.75	.70	.75	.75
Savage	.80	.75	.75	.60	.60	.60
Scorpion	..	..	..	..	..	..
Sierra Nevada	2½	2⅝	2½	2⅛	2⅜	2¼
Silver King	..	..	..	..	..	..
Tip Top	..	..	..	..	..	..
Union Cons	1½	1⅝	1½	1½	1⅜	1⅛
Utah	..	..	1	1	1	1
Wales Cons	..	..	..	..	..	..
Yellow Jacket	2	2¼	2⅜	2¼	2	2⅛

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows for the week :

Saturday, oil opened at 94¾c., sold up to 95⅝c., broke to 93c., and closed on a rally at 94c. During the day, Monday, the market fluctuated between 94½c. at the opening and 93¼c. at the lowest point, closing at 94¼c. The monthly report of operations in the field published that day had but little influence on the market, as honors were easy between its bullish and bearish features. It showed an increase of 74 barrels in the production, but from 39 less wells than were opened in February. The average per well was 13 barrels less than those opened in March, 1883. The report showed an increase of 39 rigs up and decrease of 11 in wells drilling. On April 1st, the market broke to 92⅜c. amid great excitement, and on the 2d to 90⅛c. It is hard to explain this break, as the market had had no reaction of consequence since it broke to 99c. There was a frenzy of selling and a free calling of margins that dislodged long oil, and the bears had it all their own way. On Thursday, the market opened at 90¾c., soon reaching 90⅛c. and quickly rallying to 92⅝, but selling back to 91½c. at the close. During all these days, the bears made money, and, flushed with success, we believe that they have oversold the market, and the turn that may be expected showed itself in to-day's prices, which opened at 91¾c. and closes after the Board 93⅜c. bid.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange :

		Opening.	Highest.	Lowest.	Closing.	Sales.
March	29	$0.94¾	$0.95⅝	$0.93	$0.94	8,746,000
	31	.94½	.94¾	.93¼	.94¼	6,471,000
April	1	.94¾	.94¾	.92⅞	.92⅞	9,356,000
	2	.92¾	.92⅞	.90½	.90⅝	7,138,000
	3	.90¾	.92⅝	.90⅛	.91⅛	9,898,000
	4	.91¾	.94½	.91⅝	.93⅝	7,437,000
Total sales						46,046,000

BULLION MARKET.

NEW YORK, Friday Evening, April 4.

The market abroad and here is very quiet and without any features worthy of comment.

DATE.	London.	N. Y.	DATE.	London.	N. Y.
	Pence.	Cents.		Pence.	Cents.
M'rch 29	50 1-16	111¼	April 2	50 11-16	111¼
31	50 1-16	111¼	3	50 11-16	111¼
April 1	50 1-16	111¼	4	50⅝	111⅛

BULLION PRODUCTION FOR 1884.

MINES.	States.	Month of February.	Year from Jan. 1st, 1884.
		$	$
*Alice, G. S.	Mont.	†110,540	209.296
*Belmont	Mont.	..	8.081
Bodie, G.	Cal.	32,683	62,683
*Bonanza King, S.	Cal.	42,039	98.317
*Boston & Montana, G.	Mont.	25,498	76,699
*Chrysolite, S. L.	Colo.	10,285	16.255
*Consolidated Bobtail, G	Colo.	8,242	16.411
*Contention, S. G.	Ariz.	59,853	140,292
*Deadwood-Terra, G.	Dak.	42,483	89.679
*Derbec Blue Gravel, G. S.	Colo.	6.045	19,668
*Father de Smet, G.	Dak.	31,082	56,177
Grand Prize, S.	Nev.	..	25.000
*Hecla Cons., G. S. L.	Mont.	‡77,063	162,178
*Homestake, G.	Dak.	96,356	200,587
*Hope, S.	Mont.	15,433	15,433
Horn-Silver, S. L.	Utah.	150,000	324,000
*Iron Silver, S. L.	Colo.	66,887	125.882
*Kentuck, G. S.	Nev.	4,223	8.033
*Lexington, G. S.	Mont.	90,956	201.402
*Little Pittsburg, S.	Colo.	9,377	17,965
Moulton, S.	Mont.	60,000	122.000
*Mount Diablo, S.	Nev.	..	24,820
*Navajo, G. S.	Nev.	43,033	71,8 3
*Ontario, S. L.	Utah.	174,902	338.478
*Oxford, G.	N. S.	3,500	7,160
*Plymouth Consolidated, G	Cal.	84,063	186,501
*South Yuba, G.	Cal.	..	2,040
Standard Cons., G.	Cal.	3,818	3,818
*Syndicate, G. S.	Cal.	14,624	29,859
*Tombstone, S. L.	Ariz.	†49,710	122,756
Total amount of shipments to date			$2,783,343

† Official † Assay value. ‡ Not including value of lead. G. Gold ; S. Silver ; L. Lead.

United States Assay-Office at New York.—Statement of business for the month ended March 31st, 1884 :

Deposits of gold :		
Foreign coin	$42.000	
Foreign bullion	50,000	
United States bullion	510,000	
United States bullion (re-deposits)	401,000	
Jewelers' bars	97,000	
Refined gold	215,000	$1,316,000
Deposits of silver :		
Jewelers' bars	15,000	
Foreign coin	1,100	
Foreign bullion	22,900	
United States bullion (contained in gold)	7,900	
United States bullion (re-deposits)	5,100	
Arizona	5,000	
Colorado	11,000	
Lake Superior	1,800	
Montana	123,000	
New Mexico	3.500	
Utah	165,500	
Refined silver	129,000	491,000
Total deposits		$1,807,000
Gold bars stamped	$2,026,743	
Silver bars stamped	520,679	$2,547,422

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, reduced the bank's minimum rate of discount ½ per cent to 2½ per cent. During the week, the bank lost £130,000 bullion, and the proportion of its reserve to its liabilities was reduced from 47 8-16 per cent to 44 7-16 per cent, against 34 5-16 per cent at this date last year. The weekly statement of the

Bank of France shows an increase of 1,175,000 francs gold, and an increase of 2,700,000 francs silver. The Imperial Bank of Germany lost specie during the week to the amount of 21,680,000 marks (!).

IRON MARKET REVIEW.

NEW YORK, Friday Evening, April 4.

At the New York Metal Exchange, the following officers were elected on the 2d inst., after an active contest: For President—T. Delafield. For Vice-President—Frank Dickerson. For Treasurer—Carl Mayer. For Secretary—Edward J. Shriver. For Managers—Joshua Hendricks, John J. Williams, Adolph Ladenburg, George V. Tompkins, H. B. Moore, Elliott F. Driggs, George A. Boynton, George E. Moore, Austin G. Gorham, Robert M. Thompson, W. G. Crenshaw, Jr., William Hagan, W. W. Van Voorhis, U. O. Crane. For Arbitration Committee—John C. Cook, J. C. Yates, John Parsons, C. E. Maxwell, Edmund Hendricks. For Inspectors of Election—S. Mendel, Ernest Brandon, George Nissen.

Mr. E. J. Shriver, Secretary of the Exchange, has compiled the following figures showing imports into New York:

METALS.	IMPORTS.		
	Feb., 1884. Tons.	March, 1884. Tons.	March, 1883. Tons.
Pig-iron	3,661	7,983	9,673
Iron ore	2,711	1,700	1,756
Spiegel iron	3,370	4,142	3,169
Old rails	83	.....	740
Scrap-iron	1,499	791	2,806
Scrap-steel	160	94	1,051
Steel blooms	79	767	14
New steel rails	921	2,659	2,460
Steel-wire rods	4,306	4,171	12,873
Iron-wire rods	788	1,979	202
Swedish iron	427	376	1,306
Iron bds. and bars	32	34	213
Iron beams	26	.....	408
Hoop-iron	.....	.....	370
Sheet-iron	194	247	356
Russia sheet-iron	.....	.....	.....
Steel bds., bars, etc	378	466	480
Steel tires and forgings	296	145	303

American Pig.—Practically there is no change. The demand is limited to small lots, for which makers of standard brands exact full figures. We are informed that the Thomas Iron Company is declining to take orders for some grades of iron, its full output being required to fill orders. Mill irons are in a less favorable position, and there is some irregularity.

We quote No. 1 Foundry at $20@$21; No. 2, $19@$19.50; and Gray Forge, $17.50@$18.50. There have been small sales of Bessemer pig, which remains quiet at $20.50, and 20 per cent Spiegel is quoted in round lots at $28.50@$29 ex ship. Ferro-manganese, 45 per cent, is worth $45.

At the Metal Exchange, the following transactions were recorded: Tuesday, 100 tons, No. 1, May, $19.37½ and 100 tons pig-iron certificates, October, $18.50.

Scotch Pig.—The market is very quiet, and very little business is doing. Importers are firm, though occasionally small lots on the dock are placed at lower figures.

We quote ex ship and to arrive: Coltness, $22.50@$23; Langloan, $22.25@$22.50; Summerlee, $21.50; Dalmellington, $20.75; Gartsherrie, $22@$22.50; Eglinton, $20.25; and Glengarnock, $22@$22.25.

At the Metal Exchange, the following cable quotations have been received: Coltness, 57s. 6d.; Langloan, 53s. 6d.; Summerlee, 51s. 6d.; Gartsherrie, 52s. 6d.; Glengarnock, at Ardrossan, 51s. 6d.; Dalmellington, 48s.; and Eglinton, 45s. 9d. Warrants, 42s. 2d.

Steel Rails.—There is nothing new to report. We quote $33.25@$33.50 at mill.

Old Material.—There has been some business. We quote $21 for Ts.

Philadelphia. April 4.

Pig-Iron.—There is a great deal of dissatisfaction expressed at the backwardness of buyers of both crude and finished irons, and at the weakness of prices, and the rather downward tendency which continues in nearly all branches. So far as can be ascertained, very little actual decline has taken place in prices, but all the influences seem to be in that direction, and the sales made during the past six days have been at inside and lowest prices, rather than at medium or top prices. The brokers who usually handle the largest quantities of pig-iron are unable to report any large transactions, and say that business is made up of small lots, at about the prices prevailing for the past few weeks. There are a few offers in hand at lower prices for large lots, and some business is probable. The market is dull, and while the demand for finished iron continues as irregular as it now is, nothing is likely to be done on a large scale. The standard companies are making large deliveries on old contracts, but report only a moderate inquiry for new contracts. It is the opinion of leading authorities in the trade that business will not assume large proportions for some weeks to come. Neither side sees any reason for departing from the policy which has been so long followed. A few of the special brands are held quite firmly, and no shadings are admitted, although in one or two cases, sales of special brands have been made at a little below the asking prices. Considerable No. 1 Foundry has sold at $20, and comparatively little at $21. No. 2 iron has sold as low as $18, and as high as $19.50; $19 buys the average standard make. Mill owners are backward about placing large orders for forge, although very tempting offers have been made to several. Two or three negotiations for Forge are now going on, and may result in business before the close of the week, at about $18. Small lots of best Forge have sold at $19, and $17 has been taken for the other extreme. After all that has been said of the dullness of the market, and the unfavorable outlook, it must be admitted that the average quantity of iron is going into consumption, but purchases are made from day to day, and from week to week, instead of, as in former years, in large blocks.

Foreign Irons.—The same irregularity must be reported in Bessemer irons this week as last. So far as can be seen, no heavy transactions are likely to take place, owing to the unwillingness of consumers to risk large transactions at the present time. The question of freights is one unsettling element. Consumers are ready to purchase small lots for current requirements, but outside of this, very little is done. Offers have been made for 500 and 1000-ton lots, but no business has resulted. Quotations are $20.25@$21, according to the quality of iron offered. Several buyers would purchase large lots at their own terms.

Blooms.—Charcoal Blooms are quoted as usual at $55@$56, with anthracite at $45@$46.50.

Muck-Bars.—The usual movement is reported at $32@$33 quoted, but sales have been made at 50c. less.

Merchant Iron.—There is absolutely no change in the position of the merchant bar market. Some offerings of Western iron have been made in the interior of the State, and there is considerable competition between the two sections. Prices are certainly not strong, but there is very little room for any further cutting, and therefore they may be called steady, or at least stationary. Present asking prices will be and in fact must be obtained if business is done. Quotations range from 1·65@2c., according to quality of iron. Only a few large lots have been sold, most of the business having been done in small lots. At stores there is a liberal stock of iron on hand, and sales are reported about as they have been all along. As in crude iron, a large amount is going into consumption in spite of the dullness in trade; but the market lacks the vitality which it would have were the same amount of business done in large lots.

Nails.—Nail men are holding their own as to prices, and have received more encouragement as to demand within the past week; but it is not likely that very heavy transactions will take place. Contractors who are in a position to know about how much building will be done this year speak favorably of the prospects for building here and elsewhere; but, owing to the large producing capacity, and the danger of the market becoming overstocked, buyers are only providing for what they need from week to week and month to month. Jobbing lots are moving at current prices. Very little shading is going on; but here and there, a little less than asking prices is accepted for a good lot.

Plate and Tank Iron.—Manufacturers of plate and tank iron in Eastern Pennsylvania have not by any means all they can do; but a number of bids are out, and manufacturers are anxiously waiting for replies. Some few specifications are also under consideration. Taking the market as it is at present, there is not much of an encouraging character to report, but a good deal of business in a small way is coming along. Quotations are 2·20c. for Plate, 2·25c. for Tank, 2 75c. for Shell, 3·75c. for Flange, and 4·75c. for Fire-Box.

Sheet-Iron.—Manufacturers of sheet-iron report, so far, only a moderate movement. One or two have received a few good orders, and therefore speak with considerable confidence as to the coming demand. A large amount of sheet-iron of all kinds will certainly be used this year, but it is not likely that the demand will be such as to crowd the mills, or permit any advance in prices.

Merchant Steel.—Dealers in merchant steel report a rather backward demand for the season, but there is no particular shading of prices to secure the floating business.

Structural Iron.—Those manufacturers who have had bids in for several weeks for from 9000 to 12,000 tons of structural iron report that orders have not yet been placed, but are looked for every day. No explanation of the delay is given. Brokers and manufacturers of structural iron report a moderate business coming along from week to week, but nothing deserving of special comment. Quotations are as follows: 2·20@2·25c. for Angles, 2·25c. for Bridge Plates, 2·7c. for Tees, and 3·50c. for Beams and Channels, the latter subject to 12½ per cent discount on large lots. Competition is quite active where large orders are in question, and as there is not enough business to keep all going, prices are necessarily very low.

Steel Rails.—As to steel rails, very contrary statements have been made, but owing to the reticence of the steel rail companies, very little can be learned as to the actual state of affairs. Heavy contracts are not placing; inquiries for moderately large lots have been made, but there is very little probability of orders being placed just now. Representatives of large buyers claim that, when the next batch of steel rails is bought, considerably under $34 will be paid. The quotation of steel rails at the Metal Exchange at $32.50@$33 is without foundation. The actual quotations are $34@$35, a statement made upon the authority of three leading steel companies of this State. Your correspondent is prepared to purchase and pay for all the steel rails that will be sold at $32 50. At the same time, it is correct to say that two mills, unnecessary to mention, have taken exceptional prices for emergency lots of rails; but these orders could not be duplicated to-day, and do not fairly represent the condition of the steel rail market.

Old Rails.—Large lots of old rails are wanted at $21.50@$21.75, with sellers a little higher. One good sale of Tees is reported at $22. Bridge Rails are quoted at $23.50@$24; Double-Heads, $23.50@$24.50.

Scrap-Iron.—Supplies of good scrap iron are light, and best No. 1 commands $24@$24.50 in small lots. Cargo is offered at $22@$22.50.

Pittsburg. April 3.

[From our Special Correspondent.]

The cloud of the approaching "scale" is hardly bigger than a man's hand, and is nearly two months away. But its effect is noted in the present situation. Manufacturers deny that they are worrying over this approaching trouble, but nevertheless it is an element in the situation. The scarcity of orders continues in many mills, and is a subject of general comment. In fact, the first week of April brings disappointment to the trade here. It is possibly due to the fact that expectations ran too high during the winter, as to the March and April trade. And it is certain that these expectations have not been fulfilled. Instead, there is a sluggish condition of demand and a falling off of orders. The makers of specialties of course enjoy comparative immunity from this dullness. Take, for instance, the last new thing, steel nails. Shoenberger, Speer & Co. have at last succeeded in getting a steel that answers the purpose. Mr. Speer tells me that the sample orders sent out have awakened decided interest. Prices obtained for these have ruled about the same as for iron nails, and the indications are, that steel nails are going to enjoy a supremacy of their own.

Prices in metal may be quoted as follows: All Ore Forge, $18.50@$19 cash; Charcoal Foundry Cold Blast, $28; Muck-Bars, $31@$31.50.

Window-glass men doing fairly well. As an instance of the use of natural gas in the making of plate-glass here, I may cite the workings of the Pitts-

DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital stock.	Shares. No.	Shares. Par value.	Assessments. Total levied to date.	Assessments. Date and amount per share of last.			Dividends. Total paid to date.	Dividends. Date and amount per share of last.		
1	Alice, s. c.	Mont	$10,000,000	400,000	$25	*				$400,000	Dec.	1881	.10
2	Amie Con., s. L.	Colo.	5,000,000	500,000	10	*				330,000	Oct.	1883	.05
3	Atlantic, c.	Mich	1,000,000	40,000	25	$280,000	Apl.	1875	$1.00	280,000	Feb.	1884	$1.00
4	Argenta, s	Nev.	10,000,000	100,000	100	275,000	Jun.	1883	.25	40,000	Feb.	1880	.20
5	Barbee & Walker, s.	Utah	1,000,000	100,000	10	*				60,000	Nov	1880	.10
6	Bassick, G. s.	Colo.	10,000,000	100,000	10	*				400,000	Mar.	1884	1.00
7	Belle Isle, s	Nev.	10,000,000	100,000	100	120,000	Mar.	1884	.20	300,000	Dec.	1879	.25
8	Belcher, G. s.	Nev.	10,400,000	104,000	100	2,588,000	Apl	1883	.25	15,307,000	Apl	1878	1.00
9	Birdseye, G	Cal.		15,000							Dec.	1882	
10	Black Bear, G.	Cal.	3,000,000	30,000	100	15,000	Sept	1879	.50	895,000	May	1883	.20
11	Bodie Con. G.	Cal.	10,000,000	100,000	100	275,000	Dec.	1883	.50	1,395,000	Apl.	1884	.50
12	Bonanza Developm't	C & M	3,000,000	400,000	10					135,000	Oct.	1882	.15
13	Bonanza King, Cons.	Cal.	1,000,000	100,000	10	*				100,600	Mar.	1884	.25
14	Boston & Mont, G.	Mont	2,000,000	200,000	10	*				310,000	Jan.	1883	.05
15	Breece, s.	Colo.	5,000,000	200,000	25	*				2,000	Feo.	1880	.01
16	Bulw r, G	Cal	1,000,000	100,000	100	30,000	Dec.	1877	.50	175,000	Jan.	1884	.10
17	California, G. s.	Nev.	54,000,000	540,000	100	1,178,000	Mar.	1884	.20	31,325,000	Dec.	1879	.50
18	Calumet & Hecla, C.	Mich	2,500,000	100,000	25					24,850,000	Jan	1884	5.00
19	Carbonate Hill, s. L.	Colo.	2,000,000	200,000	10	*				80,000	Apl.	1884	.05
20	Caribou Con., s.	Colo.	1,000,000	100,000	10	*				50,000	Mch	1880	.10
21	Carolina Queen, C.	N. C.	200,000	100,000	2					8,000	Oct.	1882	.02
22	Castle Creek, G.	Idah.	100,000	100,000	1					51,000	Oct.	1883	.03
23	Catalpa, s L	Colo.	3,000,000	300,000	10					240,000	Jun.	1883	.10
24	Central, C.	Mich	500,000	20,000	25	100,000	Sept	1861	.06	1,710,000	Feb.	1884	2.00
25	Christy, s.	Utah	6,000,000	60,000	100	24,000	Dec.	1883	.20	90,000	Jan.	1883	.10
26	Chrysolite, s. L.	Colo.	10,000,000	200,000	50	*				1 600,000	Dec.	1881	.50
27	Con. Bobtail, G.	Colo.	1,136,630	227,326	5	*				147,762	Mch	1880	.10
28	Con. Gold Mining, G.	Ga.	500,000	100,000	5	*				108,000	Nov	1883	.02
29	Con. Virginia, G. s.	Nev.	54,000,000	540,000	100	1,113,000	Mar.	1884	.20	42,930,000	Aug.	1880	.50
30	Contention, s	Ariz.	12,500,000	250,000	50					2,462,500	Dec.	1883	.25
31	Copper Queen, C.	Ariz.	2,500 000	250,000	10	*				1,425,000	Apl.	1884	.40
32	Crescent, s L. G.	Utah	15,000,000	300,000	25	**				150,000	Oct.	1883	.05
33	Crown Point, G. s.	Nev.	10,000,000	100,000	100	2,673,000	Feb.	1882	.25	11,588,000	Jan.	1875	2.00
34	Deadwood-Terra, G.	Dak.	5,000,000	200,000	25	*				4900,00	Jan.	1883	.10
35	Dunkin, s. L.	Colo.	5,000,000	200,000	25	*				210,000	Oct.	1883	.05
36	Eureka Con., G. s. L.	Nev.	5,000,000	50,000	100	350,000	Jan.	1884	1.00	4,767,500	July	1882	.25
37	Evening Star, s. L.	Colo.	500,000	50,000	10	*				1,300,000	Nov	1883	.50
38	Excelsior, G.	Cal.	10,000,000	200,000	100	410,000	Jan.	1884	.50	875,000	Dec.	1880	.25
39	Father de Smet, G.	Dak.	10,000,000	100,000	100					670,000	Mar.	1884	.20
40	Findley	Ga.											
41	Franklin, C.	Mich		51,000		360,000	Jun	1877		348,000	Jan.	1884	2.00
42	Freeland, s.	Colo.	5,000,000	200,000	25	*				50,000	May	1880	.25
43	Fresno Enterprise, G	Cal.	5,000,000	100,000	50		Mch	1883	.10	110,000	July	1882	.10
44	Gem s	Colo.	125,000	125,000	1					23,750	May	1883	.02
45	Glass-Pendery, s. L	Colo.	5,000,000	250,000	20	*				25,000	May	1881	.10
46	Glen. s.	Colo.	100,000	100,000	1					7 000	May	1883	.01
47	Gould & Curry, G. s.	Nev.	10,800,000	108,000	100	3,638,000	Mar.	1884	.50	3,826,000	Oct.	1870	10.00
48	Grand Central, s.	Ariz.	1,000,000	100,000	10					625,000	Dec.	1882	.25
49	Grand Prize, s.	Nev.	10,000,000	100,000	100	495,000	Mar.	1884	.25	495,000	Mar.	1884	.25
50	Granite, s.	Colo.	125,000	125,000	1					6,250	May	1883	.01
51	Great Eastern, G.	Dak.	3 0,000	300,000	1	*				16,000	July	1880	.01
52	Great Western, G.	al.	5,00 ,000	50,000	100	35,500	Aug	1873	.15	262,500	Oct.	1882	.25
53	Green Mountain, G.	Cal.	1,250,000	125,000	10	*				212,000	Nov.	1881	.07½
54	Hale & Norcross, G. s	Nev.	11,200,000	112,000	100	4,230,000	Jan.	1884	.50	1,598,000	Apl	1871	5.00
55	Hall-Anderson, G.	N. S.	150,000	150,000	1					7,000	Jan.	1882	.05
56	Hecla Con., s.	Mont	1,500,000	30,000	50					597,500	Apl.	1884	.50
57	Henriett, L.	Colo.		270,000						27,000	Feb.	1883	.10
58	Hibernia, s. L.	Colo.	7,500,000	300,000	25	*				180,000	July	1881	.40
59	Holyoke, G	Idah.	200,000	200,000	1					52,000	Nov	1883	.02
60	Homestake, G.	Dak	12,500,000	125,000	100	200,000	July	1878	1.00	2,382,500	Mar.	1884	.20
61	Hope, s.	Mont	400,000	8,000	50	*				136,340	Mar.	1884	1.50
62	Horn-Silver, s. L.	Utah	10,000,000	400,000	25	*				3,100,000	Feb.	1884	.50
63	Howell S. & M. Co	Ariz.	375,000	187,500	2	*				3,750	Aug.	1883	.01
64	Hukill, G. s.	Colo.	1,000,000	200,000	5	*				210,000	Dec.	1878	.10
65	Idaho, G	Cal.	310,000	3,100	100	*				3,445,650	Mar.	1884	5.00
66	Independence, s.	Nev.	10,000,000	100,000	100	285,000	Mar.	1884	.20	225,000	Sept	1879	.25
67	Indian Queen, s	Nev.	250,000	125,000	2					368,750	July	1883	.03
68	Inyo, G	Cal.	500,000	100,000	5	*				45,000	Apl.	1882	.05
69	Iron-Silver, s. L	Colo.	10,000,000	500,000	20	*				1,300,000	Jan.	1884	.20
70	Jackson, G. s.	Nev.	5,000,000	50,000	100	10,000	Nov.	1880	.20	10,000	Jan	1884	.10
71	Joculstita, s.	Mex.	10,000,000	100,000	100					1,000,000	Feb.	1884	.50
72	Kentuck	Nev.	3,000,000	30,000	100	342,000	Nov	1881	.30	1,279,000	Mar.	1884	.10
73	La Plata, s. L.	Colo.	2,000,000	200,000	10	*				610,000	Sept	1882	.30
74	Leadville, s. L.	Colo.	4,000,000	400,000	10	*				330,000	Dec.	1883	.05
75	Leeds, s.	Utah	6,000,000	60,000	100	87,000	July	1882	.50	78,000	Oct.	1878	.15
76	Little Chief, s. L.	Colo	10,000,000	200,000	50	*				740,000	Jan.	1884	.10
77	Little Pittsburg, s. L.	Colo.	20,000,000	200,000	100	*				1,050,000	Mch	1880	.50
78	Marguerite, G.	Cal.	500,000	25,000	20					18.750	Oct.	1882	.25
79	Martin White, s.	Nev.	10,000,000	100,000	100	1,050,000	Dec.	1883	.25	90,000	July	1879	.30
80	Minas Nuevas, s.	Mex.	300,000	100,000	3	*				20,000	July	1883	.10
81	Morning Star, s. L.	Colo.	1,000,000	100,000	10					615,000	Oct.	1883	.25
82	Mount Pleasant, G.	Calif.	150,000	150,000	1					105,000	Mar.	1884	.10
83	Mt. Diablo, s	Nev	5,000,000	50,000	100	137,500	Jun.	1880	2.00	50,000	Nov.	1883	.25
84	Napa, Q	Cal.	700,000	100,000	7					290,000	Jan.	1883	.10
85	Navajo, G. s	Nev.	10,000,000	100,000	100	235,000	Mch	1882	.20	225,000	May	1883	.25
86	New York Hill, G.	Cal.	5,000,000	50,000	100	55,000	Mch	1878	.20	215,000	Aug.	1882	.10
87	New York & Colo., G.	Colo.	1,250,000	50,000	25					25,000	July	1879	.10
88	Northern Belle, s	Nev.	5,000,000	50,000	100	425,000	Jan.	1884	8.00	2,400,000	Apl.	1883	.50
89	North Belle Isle, s.	Nev.	10,000,000	100,000	100	105,000	Jan.	1884	.10	31,000	Aug.	1881	.15
90	Ontario, s. L.	Utah	15,000,000	150,000	100					5,375,000	Mar.	1 84	.50
91	Ophir, G. s	Nev.	10,000,000	100,000	100	3,695,000	Feb	1884	.50	1,595,000	July	1862	1.00
92	Osceola, C.	Mich	1,250,000	50,000	25	480,000	Apl.	1876	1.60	1,335,000	Mar.	1884	.50
93	Oxford, G	N. S.	100,000	100,000	1	*				40,000	Mar	1884	.05
94	Pleasant Valley, G. s.	Cal.	10,000,000	100,000	100	40,000	Mar.	1884	.10	30,000	Dec.	1882	.05
95	Plymouth Con., G.	Cal.	5,000,000	100,000	50	*				500,000	Mar.	1884	.50
96	Polonia, s.	Colo.	200,000	8,000	25					12,000		1881	1.50
97	Prussian, s. L.	Colo	1,500,000	150,000	10					132,000	Jan	1883	.10
98	Quick-liver, pref., Q	Cal.	4,300,000	43,000	100					696,900	F.b.	1881	.30
99	" com., Q	Cal.	5,700,000	57,000	100					151,000	July	1882	.40
100	Quincy, C.	Mich	1,200,000	40,000	25	200,000	Dec.	1862	5.00	3,764,000	Jan.	1884	4.50
101	Renfrew, G.	N. S.	60,000	30,000	2					4,800	July	1882	.02
102	Richmond, s. L.	Nev.	1,350,000	54,000	25	*				4,042,587	May	1883	1.25
103	Rising Sun, s.	Dak.	750,000	150,000	5	*				52,000	May	1881	.07½
104	Robinson Bar, G.	Idah.	1,000,000	100,000	1	*				9,000	Dec.	1882	.03
105	Robinson Con, s. L.	Colo.	10,000,000	200,000	50					575,000	Nov	1881	.50
106	Robert E Lee, s L.	Colo.	250,000,000	500,000	500					100,000	Dec.	1882	.10
107	San Francisco, C.	Cal.	5,000,000	50,000	100	45,000	Sept	1880	.50	20,000	Feb.	1883	.05
108	Savage, s.	Nev.	11,250,000	112,500	100	5,652,000	Feb.	1884	.50	4,460,000	July	1869	3.00
109	Shoshone, G.	Idah.	150,000	150,000	1					7,500	Apl	1883	.01
110	Sierra Buttes, G.	Cal.	225,000	22,500	10					1,450,933	Oct.	1883	.25
111	Sierra Grande, s.	N. M.	10,000,000	400,000	25					700,000	Oct.	1883	.25
112	Sierra Nevada, G. s.	Nev.	10,000,000	100,000	100	5,450,000	Jan.	1884	1.00	102,000	Jan.	1871	1.00
113	S'a P'mas Eureka, G	Cal.		40,655							Apl.	1882	
114	Silver Cord, G. s. L.	Colo	4,500,000	450000	10					225,000	Nov	1883	.25
115	Silver King, s.	Ariz.	1,000,000	100,000	100					1,300,000	Dec.	1883	.25
116	Silver King, s.	Colo.	1,000,000	500,000	2					50,000	Aug.	1881	.10
117	Smuggler, s L.	Colo.	600,000	60,000	10					66,700	Aug.	1883	.25
118	Socorro, C.	N. M.	250,000	2,500	100					4,000	Mch	1882	.00¾
119	South Yuba, G.	Cal.	2,000,000	40,000	50	*				150,000	Oct.	1881	.75
120	Spring Valley, G.	Cal.	200,000	200,000	1	*				50,000	Jan.	1881	.25
121	Standard, G. s.	Cal.	10 000,000	100,000	100					4,400,000	Mar.	1884	.25
122	Stormont, s	Utah	200,000	200,000	1	*				155,000	Nov.	1881	.05
123	St. Joseph, L.	Mo.	1,000,000	100,000	10	*				390,000	Dec.	1882	.20
124	Top Top, s	Ariz.	10,000,000	100,000	100	250,000	Sept	1883	.25	100,000	Nov.	1881	.20
125	Tombstone, G. s.	Ariz	12,500,000	50,000	25	*				1,250,000	Apl.	1882	.10
126	True Fissure, G. s. L.	Utah	1,500,000	150,000	10	*				75,000	Jun.	1883	.15
127	United Gregory, G.	Colo	300,000	300,000	1					42,000	Apl.	1884	.25
128	United Gold Min. Co.	Colo.									Oct.	1883	.05
129	Vizina, s	Ariz.	5,000,000	200,000	25	*				140,000	Apl.	1882	.10
130	Yellow Jacket, G s.	Nev.	12,900,000	12 ,000	100	5,358,000	Feb.	1882	1 00	2.184,000	Aug.	1871	1 50

Highest and Lowest Prices per Share at which Sales were Made.

	March 29. H.	March 29. L.	March 31. H.	March 31. L.	April 1. H.	April 1. L.	April 2. H.	April 2. L.	April 3. H.	April 3. L.	April 4. H.	April 4. L.	Sales.	
1	2.40	..	2.40										200	
2														
3														B.
4	.21												100	
5														
6											8.50		10	
7	.15								.35	.25			1,400	
8														S.F
9														
10														S.F
11														
12														
13	10.13												50	
14														P.
15									.30	.26	.25		7,400	
16			1.40								1.10		700	B.
17	.05								.02				425	
18														
19														
20														B.
21														
22											.17		300	
23														B.
24														
25														
26	.82				.85				.85				300	
27														S.F
28														
29	.10	.08	10	08	.07		.08	.05	.07	.06	.08	.04	5,065	
30														S.F
31														
32														
33														B.
34														
35														S.F.
36	4.25		4.00										140	
37														
38														
39														
40														
41														S.F.
42														S.F.
43														S.F.
44														
45														
46														S.F.
47														
48														
49														
50														
51														
52														
53	2.00	1.95	2.00		1.95		2.05	2.00	2.10	2.00	2.10	2.05	4,150	
54														S.F
55	1.55	1.45	1.45		1.45		1.45		1.50	1.45	1.50	1.45	11,900	S
56														
57														
58			.05										1,000	
59														
60											8.50		10	
61														
62	7.75	7.50	7.88		8.00	7.88	8.00	7.63	8.00	7.75			3,375	
63														
64														
65														B.
66														
67														S.F.
68														
69	1.25		1.25								1.20		1,6 0	
70														E.
71														
72														
73														S.F.
74	.41		.45										300	
75														
76			.51										100	S.F
77														B.
78														
79														
80														
81														
82														
83														
84														
85									2.80		2.75		200	
86														B.
87														
88														B
89														
90														
91									1.15				200	
92														S.F.
93														
94														
95														P.
96														
97														
98														
99														S.F.
100														
101														E.
102														
103														
104														
105	.20										.20		200	E.
106														
107														B.
108														
109														E.
110														
111														P.
112	2.65		2.75		2.45				2.35				415	B.
113														S.F.
114														
115														
116											5 75		100	
117														B.
118														
119														
120														
121	2.65	2.50	2.50	2.40	2.40	2.20	2.25	2.10	2.10	1.85	1 85	1.25	3,735	
122														
123														
124														B.
125														
126														
127														E.
128														B.
129														
130														

*Non-assessable. † The Deadwood has previously paid $275,000 in eleven dividends, and the Terra $75,000. ‡This company, as the Western, up to December 10th, 1881, paid $1,400,000. Quotations of these stocks will be found in S. F., San Francisco; B., Boston; and P., Philadelphia, tables. E are British companies. ‖ Total number of shares, 500,000; 50,000 shares have never been issued, and are still held by the company. Dividend shares sold, 42,295. **Non-assessable for 3 years.

burg Plate-Glass Works. They would use 4000 bushels of coal every twenty-four hours if located anywhere else; but here there is not a pound of coal consumed, and 16,000 square feet of glass are turned out every week, many of the plates measuring 11½ by 12 feet.

The general situation in iron is one of expectancy, and the tendency of the trade, in the opinion of the best informed, is toward better prices.

NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. Number.	Shares. Par Value.	Assessments. Total levied to date.	Assessments. Date and amount per share of last.			Highest and Lowest Prices per Share at which Sales were Made. March 29. H.	March 29. L.	March 31. H.	March 31. L.	April 1. H.	April 1. L.	April 2. H.	April 2. L.	April 3. H.	April 3. L.	April 4. H.	April 4. L.	Sales.	
1	Advance M & M. Co.																						
2	Albion, s. L.	Nevada	$15,000,000	150,000	$100	$622.5 0	July	1883	.50														S. F.
3	Allouez, c.	Michigan	2,000,000	80,000	25	240,000	February	1884	.50														B.
4	Alpha Con., g. s.	Nevada	3,000,000	30,000	100	430,000	January	1884	.50														S. F.
5	Alta, s.	Nevada	10,080,000	100,800	100	2,187,690	January	1884	.25														S. F.
6	Alta-Montana, g. & L.	Montana	5,000,000	500,000	10																		
7	American Flag, s.	Colorado	1,250,000	125,000	10	300,000	June	1877	.25														
8	Barcelona, g.	Nevada	5,000,000	200,000	25	*				.13												100	
9	Battle Creek																						
10	Bear Creek	California	300,000	300,000	1																		
11	Beauce																						
12	Bechtel Con., g.	California	10,000,000	100,000	100	185,000	January	1883	.10														S. F.
13	Belvidere																						S. F.
14	Best & Belcher, g. s	Nevada	10,080,000	1 6,800	100	1,496,990	February	1884	.50														
15	Big Pittsburg, s. L.	Colorado	20,000,000	20,000	100	*																	
16	Black Jack, g.	California	250,000	100,000	2½																		
17	Bonanza Chief	Montana	1,000,000	1,000,000	1	*																	
18	Bondholder	Colorado	5,000,000	200,000	2½																		
19	Boston Con., g.	California	10,000,000	100,000	100	120,000	November	1883	.25														
20	Boulder Con.	Colorado																					
21	Bradshaw, s.	Arizona	2,250,000	225,000	10																		
22	Buckeye	Colorado	2,000,000	400,000	5	*																	
23	" preferred	Colorado																					
24	Bull Domingo, s. L.	Colorado	10,000,000	200,000	50	*										.06						500	
25	Bullion, g. s.	Nevada	10,000,000	100,000	100	3,787,000	Nov	1883	.20														S. F.
26	Bye and Bye	Arizona	1,000,000	100,000	10	*																	
27	Calaveras, g.	California	500,000	500,000	1	*																	
28	Cal. W'r & M. Co., g.	California																					
29	Caledonia, s. H., g.	Dakota	10,000,000	100,000	100	490,000	October	1883	.10														
30	Castle Creek																						
31	Catskill, s.	Nevada	1,500,000	300,000	5																		
32	Central Arizona, s.	Arizona	10,000,000	100,000	100					.21	.20					.19						700	B.
33	Chapparal	California																					
34	Cherokee, g.	California	1,500,000	15,000	10																		
35	Cholla, s.	Nevada	11,200,000	112,000	100	633,000	August	1883	1.00														S. F.
36	Climax																						
37	Colorado Central															.40						35	
38	Con. Imperial, g. s.	Nevada	50,000,000	500,000	100	1,450,000	May	1883	.05														
39	Con. Pacific, g.	California	6,000,000	60,000	100	150,000	March	1883	.15														
40	Crescent, s. L.	Colorado	3,000,000	300,000	10	*																	
41	Crowell, g.	North Car.	500,000	500,000	1																		B.
42	Dahlonega, g.	Georgia	250,000	250,000	1	*																	
43	Dardanelles, g.	California	1,000,000	100,000	10																		
44	Decatur																	.02				200	
45	Dunderberg, s.	Colorado	1,500,000	150,000	10	*																	
46	Durango, g.	Colorado	500,000	500,000	1	*				.05		.05										1,600	
47	Eastern Oregon																	.04				200	
48	Elko Con., s.	Nevada					March	1884	.15														
49	Empire, s.	Utah	10,000,000	100,000	100																		B.
50	Enterprise	Colorado																					
51	Exchequer	Nevada	10,000,000	1 0,000	100	650,000	June	1883	.20														
52	Fannie Barret, s.	Colorado																					
53	Globe Copper	Arizona																					
54	Gold Placer, g.	Colorado	5,000,000	200,000	25	*																	
55	Goodshaw, g.	California	10,000,000	100,000	100	220,000	January	1884	.10														
56	Granite Mountain, s	Mont.	10,000,000	400,000	25	*																	
57	Granville, g.	North Car.	300,000	300,000	1	*																	
58	Harlem M. & M. Co, g.	California														.05						100	
59	Harshaw, s	Arizona	10,000,000	100,000	100																		B
60	Head Center, s.	Arizona	5,000,000	200,000	25	180,000	January	1884	.10														
61	Hortense, s.	Colorado	2,000,000	200,000	10																		
62	Julia, g. s.	Nevada	11,000,000	110,000	100	1,416,000	January	1884	.10														
63	Kossuth, g. s.	Nevada	10,080,000	108,000	100	421,200	August	1877	.15														
64	Lacrosse, g.	Colorado	1,000,000	100,000	10	*								.15	.13			.15	.14	.14		.15	.14	6,000	
65	Leviathan, s.	Nevada	10,000,000	100,000	100	380,000	September	1882	.25														
66	Lucerne, s.	Colorado	5,000,000	500,000	10	*																	
67	Mariposa pref., g.	California	5,000,000	50,000	100	1,687,500	December	1881															
68	" common, g.	California	10,000,000	100,000	100	1,975,000	February	1883	.25														
69	May Belle, g.	California	10,000,000	100,000	100	34,000	December	1881	.20														
70	Mayflower, s.	Nevada	10,000,000	100,000	100	60,000	March	1884	.15														
71	Mexican, g. s.	Nevada	10,000,000	100,800	100	2,470,000	December	1883	.50									1.25				20	
72	Michoacan Synd.	Mexico																					S. F.
73	Miner Boy, g. s. L.	Colorado	5,000,000	500,000	10	*																	
74	Miller	Nevada	5,000,000	200,000	25																		
75	Mono, g.	California	5,000,000	50,000	100	535,000	January	1883	.20														
76	Moose Silver, s.	Colorado	3,000,000	300,000	10	*																	S. F.
77	Moulton, g. s.	Montana	10,000,000	400,000	25	*																	
78	Nevada Syndicate																						
79	New Pittsburg																						
80	North Standard, g	California	10,000,000	100,000	100	20,000	November	1881	.10														
81	Noonday	California	600,000	60,000	10	208,000	December	1882	1.00														
82	Old Dominion, c.	Arizona	3,000,000	300,000	10	*																	S. F
83	Oriental	Nevada	2,000,000	200,000	10																		
84	Oriental & Miller, s.	Nevada	10,000,000	400,000	25																		
85	Overman, g. s.	Nevada	11,520,000	115,200	100	3,892,700	December	1883	.25														
86	Potosi	Nevada	10,200,000	112,000	100	696,640	January	1884	.50														
87	Quartz Creek																						
88	Rappahannock, g.	Virginia		250,000		*																	
89	Red Elephant, s.	Colorado	500,000	500,000	1	*																	
90	Retort M. & M. Co.	Colorado			10																		
91	San Pedro, g. s. L.	New Mex.		400,000																			
92	Silver Cliff, s.	Colorado	5,000,000	200,000	25	*																	
93	Silver Islet	Canada	1,000,000	40,000	25																		
94	Sonora Con.	Mexico																					
95	South Bodie, g.	California		100,000		100,000	March	1882	.15														
96	South Bulwer, g.	California	10,000,000	100,000	100	195,000	May	1881	.25														
97	South Hite	California	10,000,000	100,000	100		January	1883	.05														
98	South Pacific	California			5																		
99	State Line, No. 1, s.	Nevada	200,000	200,000	1																		
100	" No. 2, s.	Nevada	5,000,000	200,000	25																		
101	" No. 3, s.	Nevada	5,000,000	200,000	25																		B
102	" No. 4, s.	Nevada	5,000,000	200,000	25																		
103	" Nos. 1 and 4, s.	Nevada			25					.02										.02		300	
104	" Nos. 2 and 3, s.	Nevada																					
105	Sullivan, g. s. L.	Maine	500,000	100,000	5	125,000	December	1882	.25														
106	Sutro Tunnel	Nevada		2,000,000		*				.15	.14	.15		.14		.14		.14		.14		6,300	
107	Taylor-Plumas	California			10																		
108	Tioga, g.	California	10,000,000	100,000	100	285,000	October	1882	.10														B.
109	Tuscarora, s.	Nevada	10,000,000	100,000	100	110,000	October	1881	.15														B., P.
110	Unadilla, s.	Colorado	50,000,000	500,000	100	*																100	
111	Union Con., g. s.	Nevada	10,000,000	100,000	100	1,870,000	March	1884	1.00			2.80				2.60	2.50	1.35		2.50		480	
112	Utah, s.	Nevada	2,000,000	20,000	100	1,460,000	January	1884	1.00														
113	Vandewater	Nevada	20,000,000	200,000	100	*																	
114	Washington	Arizona	2,000,000	200,000	10																		S. F.
115	Whalen Copper	Nevada	2,500,000	100,000	25																		
116	Wide West																						
117	Willshire	California	250,000	50,000	5	*																	

G. Gold. S. Silver. L. Lead. C. Copper. * Non-assessable. † Stocks quoted on S. F. San Francisco; B., Boston; P., Philadelphia. Non-Dividend shares sold, 35,835. Total shares sold at all the Exchanges, 78,180.

METALS.

NEW YORK, Friday Evening, April 4.

Copper.—Numerous letters from abroad confirm the report that 5000 tons of Lake copper (not 50,000 as the types made it last week) have been sold abroad, the figures named being 152½ francs, equivalent to about 13 cents here. Our market remains quiet and unchanged, with Lake selling in small lots at 14¾@15⅞c., while other brands fetch 13¾@14½c. according to quality.

England cables Chili Bars slightly better to-day, £54 7s. 6d., and Best Selected £61.

Under date of March 21st, Messrs. Henry Merton & Co., of London, state:

A sale of 5000 tons of lake copper for gradual shipment to Europe until the end of the year has been reported. The business is said to have been done at 13½ cents, but we are rather inclined to the belief that it is based on the price of Chili bars.

Tin.—Quotations at the close are 18¼@18⅜c. for Straits, spot. England cables £83 12s. 6d. to-day.

Lead.—In the beginning of the week, sales aggregating 200 tons were made at 4·10c. Then a selling movement began, and nearly 1000 tons have been disposed of, some of it at 4·05c., but the bulk at 4c. some of the holders showing a weakening tendency that it seems difficult to explain, in view of the fact that the metal is at least for the present in a good position statistically. It is stated that the Richmond Company has refused an offer of 4⅛c. for 10,000 tons, to be delivered over ten months. This lead seems, therefore, to be out of the market still.

From St. Louis, Messrs. John Wahl & Co. telegraph us as follows to day :

A dull and easier feeling has prevailed since we reported a week ago, and concessions must be made to effect sales. We may quote Hard and Soft lead both 3·80@3 85c. Buyers refuse to pay the price asked and sellers decline to take less, so that no business is done ; however, holders are taking it easy and do not force sales. Receipts during the week foot up to 550 tons.

Messrs. Everett and Post, of Chicago, wire us to-day :

Business has been quiet and of a limited character, with quotations at 3·85c. Our market is very dull, and there are few buyers in the market. On the other hand, scarcely any thing is offered. Freights are firm on the basis of 20 cents to New York.

Spelter.—The market is quiet, but remains firm at 4·60@4·65c. for ordinary domestic. England cables £14 10s. for Silesian.

Antimony.—We quote 11c. for Hallett's, 11⅝c. for Cookson's, and 10⅞ for Pontifex.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, April 4.

Anthracite.

The market is kept in suspense by the inability or the unwillingness of the coal companies to arrive at a conclusion as to what their future programme will be. There has been full-time this week, because some of the companies wanted it, but it was confidently expected that whatever was to be done would be announced promptly. We stated last week that in our opinion lower prices would prevail if full-time were begun. We may add now, that it appears to be the opinion of buyers generally, and of not a few shrewd and experienced sellers, that they will weaken, even if half-time is decided upon. With such opinions gaining ground, and with the companies apparently insisting upon a policy of procrastination, it is not strange that business is generally reported extremely dull.

Bituminous.

It is reported that the contract for supplying the Long Island Railroad with about 30,000 tons of coal has been received by Clearfield shippers, and that the Boston & Albany Railroad contract has been awarded, the amounts for the western end going to Clearfield shippers and for the eastern end to Cumberland companies. In both instances, the prices are said to have been low. Business is quiet and dull and closely contested.

Philadelphia. April 4.

[From our Special Correspondent.]

The announcement of a restriction of production in the anthracite region is premature. The question of restriction is under serious consideration, and is favored by some companies, but not by others. The New York interests are more anxious for a restriction than the Philadelphia interests. There is a good deal to be said on both sides, and representatives of the various companies, who have been talking the matter over, have been unable to come to a conclusion which would be satisfactory to all, but think that a conclusion may be suddenly arrived at at any time. The facts of the matter have been found to be about these : The full volume of the anticipated business has not been presented ; consumers are backward ; the market is rather sluggish ; small stocks are carried, and this policy is likely to be followed for an indefinite period. The consumers are confident that the companies can not hold prices where they are, as the full production will be sufficient to depress prices, in spite of any attempted combination to keep them up. These are, in brief, the reasons given by the various parties whom your correspondent has interviewed upon the question. Some very sanguine views are expressed, notwithstanding the fact that the supply of coal is not as readily marketed as could be desired. Some large contracts have been placed, two or three of them of a very desirable character. Some very good inquiries are coming along, not only from one, but from all markets. The proceedings of the Western Anthracite Association afford considerable gratification to coal interests here, large and small. It is believed that an understanding will be reached that will harmonize the shipping interests West. The large amount of capital that has been expended at Buffalo and other ports to facilitate shipments has not been ill spent, as is shown by the inquiries coming to hand, and information furnished by Western agents as to the probable demand this year. A further restriction during April of at least six days is decidedly favored, and it is likely that, if made, it will be extended into May. The capacity of some mines has been considerably increased. Considerable anxiety is felt as to the opening of the spring trade. The trade just now is about the same as it was last year, when it was not fully developed until April 15th. A good many orders are held back, to see what the companies will do. New England inquiries are fair. Western inquiries are very encouraging. A good deal of coal will be wanted along the Atlantic coast, where the use of anthracite is extending considerably. The local and line trade is rather flat. Manufacturing consumers are not buying very heavily, and feel that the safest thing for them to do is to wait. There are three or four exceptions to this rule, however. Inferior coals are heavily shaded. Taking the market all in all, it is in favor of buyers, and the larger consumers are therefore keeping back their orders until the weakening tendency has done its full work. Expressions from the most conservative members of the trade here are, that business for this season will be large and satisfactory, and that there is no occasion for anxiety. All restriction will be made that is found necessary to maintain prices. The bituminous competition, about which so much has been said, will not seriously interfere with the anthracite trade this year, and an improvement in manufacturing demand will be developed in due time.

The bituminous coal trade is looking up. Leading operators talk better. Some have been doing considerable business, while others are complaining that trade is dull and prices low. Some considerable shading is still going on ; but in general, prices are better, and during the week, some very heavy contracts will probably be placed. It is yet uncertain how far bituminous coal will supplant anthracite. Some dealers have pushed anthracite out here, and think they can hold contracts when present supplies are exhausted. Coal is 50 cents lower this year than last, and freights are also less, making a difference of at least 75 cents a ton to the consumer. The Clearfield region is not fully at work ; the larger mines are in at 40 cents. Some of the miners are still out, but it is probable that all will soon be at work, although the newspapers, anxious for some news, talk to the contrary. A strike may possibly grow out of the Clearfield reduction, however. If the miners were left to themselves, they would all resume work. The unrest there grows out of the agitations of the few. Vanderbilt's road has been surveyed as far as Phillipsburg, but its course through Clearfield has not been decided upon. It is said that several small feeders will be constructed, but whether by the Vanderbilt people, or in conjunction with the coal operators, has not been decided. Several operators have lands that they are anxious to develop, and it is likely that they will extend their aid for that purpose.

Pittsburg. April 3.

[From our Special Correspondent.]

The second spring month opens with brighter skies for the coal and coke trades of this district ; brighter, at least, in respect to the labor situation, which had grown decidedly complicated toward the end of March. It now only needs a revival in the iron and steel trade to bring about better times in coal and coke than have been experienced here for a long time.

Railroad coal trade is slowly awaking to life under the genial influence of a three cent rate for mining, which rate went into effect on the first inst., to so continue until November 1st, 1884. It is too early to look for decided changes in this trade ; but on the Pan-Handle, pits that were closed last week are getting to work, and the average of time made in all pits has advanced from one third to one half. A cold "snap" has stimulated local yard business, and as to the lake trade, contracts are not yet announced. By May 1st, work on these will have begun in earnest ; and from present indications, a good summer season is in prospect. Gas-coal producers, in particular, are inclined to be hopeful of the future. They hold that the active development of rival fields has failed to develop a coal that can compete with Youghiogheny or second pool gas-coal, and that consumers in the Northwest and in Canada are giving intimation of increased orders for this coal. The six thousand miners in the railroad pits of this district are in nearly every instance accepting the recent decision of the Trades Tribunal, and are working wherever an opportunity offers. As to prices, these are not affected by the decline in the price of digging as yet, and it seems hardly likely that any but the largest consumers will be benefited. On the wall, coal is held at 6@6¼c., but sales under the former figure are reported.

River affairs are not so satisfactory. Some markets for river coal continue depressed, owing to continual high water, causing stocks to accumulate. Sales at Cincinnati at 7 cents, four months, have been made for some time, and this is regarded as pretty bad by shippers. The mining rate at present is 3¼c. in the first three pools, and 2¾c. in the fourth. From all I learn, this is decidedly unsatisfactory to the operators, who want a rate uniform with the railroad price, 3 cents. It seems more than likely that, before the present "spring run" has been mined, a reduction to 3 cents will be offered the men. At present, the pits are working at a lively rate and coal going out about as fast as loaded. Prices are unchanged and demand dull is at all points.

Coke is now $1.10 for Furnace, $1.25 for Foundry, orders for April only. For April, May, and June contracts, $1.20 is the rate given. For Crushed, there is no change, and it remains at $1.75 per ton. The demand is as yet unchanged, though it seems more likely to fall off than to increase. Objections to the operations of the coke syndicate are taken very decidedly by the Cambria Iron Company, at Johnstown, Pa ,one of the largest consumers in the country. It is looking about for coke-works of its own, and if it gets them, it will not be the fault of the syndicate that controls the new dispensation.

Buffalo. April 3.

[From our Special Correspondent.]

By Telegraph : The Erie Railroad has reduced freights to Buffalo on coal from all mines along the Alleghany Valley Railroad, from $1.50 *to* $1.15 *per gross ton.*

There is nothing specially important to report this week in the coal and coke trade. Prices are nominally unchanged. Dealers are awaiting the spring schedule of prices for anthracite, and consumers are using up their supplies laid in last summer, or buying only from necessity. Manufacturers are not working to full capacity yet, but hope to be able to do so at an early date. Vessel-owners will require fuel before the end of the month without doubt.

You will probably have the news of the result of the "committee's" deliberations in New York to govern your conclusions before this reaches your readers ; therefore I abstain from any comments on the situation. I understand that the "committee" at its last meeting in New York did not accomplish any definite work as far as heard from. It is said to be in favor of curtailing production and securing harmonious working or relations with the railroads. Next Monday, the "committee" will meet again ; in the mean time, we must await patiently the fiat for the coming season's operations, prices, etc., etc.

The *Iron Review* of April 1st, published here, says: "Our advices from coal-distributing centers are not quite so encouraging. Spring demand is rather backward ; anthracite is especially weak and a further restriction [of production] is reported as possible. Bituminous coal is supplanting, more or less, anthracite, but the probabilities are that, with the expanding markets for anthracite, that fuel will not suffer by the competition. Western coal markets are beginning to open up, and several thousand miners have started to work in the States between Pennsylvania and the Mississippi."

There is nothing definite to communicate relative to freights by lake Westward.

The cut in railroad rates from West to East has paralyzed engagements by the water route. Vessel-owners are relying upon the movement of coal to help them along, so that the up and down freight com

bined may average a living rate. Seventy-five cents a ton is asked to Chicago, with fifty cents bid; it is likely that a compromise may be effected on the opening of navigation at something like sixty-five cents. Last year, the vessel men were paid sixty cents at the start.

It is reported here that Captain Bradley, of Cleveland, will take 50,000 tons of coal from Ashtabula to Port Arthur, Lake Superior, at $1.10 or $1.15 per gross ton, as soon as the opening of navigation permits.

As far as heard from, 28 vessels are under construction at lake ports, namely, 20 steamers, 6 barges, and 2 sail vessels. All these are of large tonnage, but not equal to the losses of last season by many tons. One is building on the Welland Canal (Canada), seven on Lake Erie, seven on the Detroit River, eight on Lake Huron and Saginaw Bay, and five on Lake Michigan. Sixteen of the craft are to be over 1500 tons capacity each.

Lake Michigan is said to be practically free from ice, and many vessels have gone into commission for the coastwise trade. The small propeller Algomah made her way through the ice from Point St. Ignace, Lake Michigan, to Mackinac City in five days, arriving there last Tuesday. Dynamite was used to break the ice.

The packs and fields of ice on Lake Erie are breaking up, under the influence of strong winds; nevertheless, navigation will not be resumed for many days yet.

Some months since, I wrote you that the Lehigh Valley Railroad was to have its depot on Washington street, with land extending parallel with the Central Railroad depot. I was taken to task by the wiseacres, and the story denied. Now from the officials of the Lehigh appears a corroboration of my report, with all details added. Enough said.

The Rochester & Pittsburg Railroad directors have made an arrangement with the New York Central Railroad by which their passengers arrive and depart from that depot instead of the East Buffalo freight yards. This, of course, alludes to the Buffalo branch.

The Grand Trunk Railroad will pay about $2.47 per gross ton for the coal delivered on its contracts at Suspension Bridge; so says Madame Rumor; but the parties interested say that the trade was on "private terms." The contract is said to be awarded as follows:

To various shippers over the Frie Railroad, 170,000 tons. To Bell, Lewis & Yates, of Buffalo, N. Y., 125,000 tons. To the Rochester & Pittsburg Coal and Iron Company, 25,000 tons. Total, 320,000 tons.

The Canadian Pacific Railroad contract was awarded as follows: To Bell, Lewis & Yates, of Buffalo, New York, 90,000 tons. To W. L. Scott & Co., Erie, Pa, 50,000 tons. To Ellsworth & Co., Chicago, Ill., 20,000 tons. Total, 160,000 tons. All the coal on the Grand Trunk contract is to be delivered at Suspension Bridge, excepting 25,000 tons at Kingston and Brockville on the St. Lawrence River. The Canadian Pacific contract is for delivery at Port Arthur, Lake Superior, and points on the St. Lawrence River and Lake Ontario ports.

Boston. April 3.

[From our Special Correspondent.]

Contrary to the expectation of many, the advent of opening prices has not been followed by any material increase of anthracite trade. Consumers, as a whole, but more particularly the retail trade, have little faith in the stability of present prices, or at least seem to consider that there need be no haste in ordering. Special objection is made to the price of egg and broken coal. Low freights have been a more important consideration in ordering, but orders on this score are generally small and more in the nature of keeping along a dealer's supply rather than in stocking up for the season. There is a further drag on general trade in the present disturbed state of the retail trade of Boston.

The usual discount of 15 cents off circular may be generally obtained on all New York coal quoting f. o. b. prices at that port at $4 for Stove and $3.65 for Broken and Egg. The Philadelphia & Reading Company claims to be obtaining full circular on small sizes. We quote f. o. b. prices at Philadelphia at $3.80 @$3.90 for Stove, and $3.40@$3.50 for Broken and Egg. With these prices more firmly established, and with stocks down to a lower point, there will be bet ter demand.

New pocket prices have been issued and are as follows on lots of 100 tons: Hard White Ash Broken and Egg, $5.10; Stove, $5.25; Nut, $5; Pea, $3.85. Free Burning White Ash Broken. $4.85; Egg, $4.90; Stove, $5.25; Nut, $5; Pea, $3.75; Lykens Valley Egg, $6.25; Stove, $6.85.

Not much is yet doing in gas-coals. The disposition of consumers here, as in every branch of the trade, is to doubt the stability of prices at the opening figures of $3.40@$3.50, f. o. b. at Baltimore and Philadelphia respectively. We hear of a few sales at a delivered price, but there is no movement in f. o. b. contracts. Concessions are looked for, and perhaps will be obtained, although dealers claim to be holding at those prices.

But few important sales of bituminous coal are now made. Most important contracts are out of the market. Notwithstanding the fact that a firmer feeling for all kinds of bituminous coal is reported, we should expect to see a large contract placed at as low figures as have ruled for some weeks past. The endeavor is mainly to establish an advance on cargo lots. The Providence Railroad has bought about 25,000 tons Cumberland coal. Other contracts are said to have been quietly placed. About $4@$4.15 is quoted as a delivered price.

There is an easier feeling in freights, which rarely go below the figures we record. At New York, no one pretends to pay over $1, while some charters are made at 80@90 cents. Philadelphia declines to $1.20. Even these rates do not seem especially desirable. There seems to be little fear that they will be higher at present. We quote:

New York, 90c@$1.10 per ton; Philadelphia, $1.20@$1.25; Baltimore, $1.40; Georgetown, nominal, $1.75; Newport News, $1.25; Richmond, $1.35; Bay of Fundy, $1.60@$1.65; Cape Breton, $2.25.

There is a very moderate retail demand, which is rather disturbed by offering in certain quarters of wharf prices of $4.50 for Broken, $4.75 for Egg, $5 for Stove—net ton. Dealers generally see no margin in such business. There is an easier feeling among all dealers, and lower prices are not far off. We quote:

White ash, furnace, egg, and nut	$5.75
" " stove	6.00@6.25
Red ash, egg	6.25
" " stove	6.50
Lorberry, egg and stove	6.50@6.75
Franklin, egg and stove	7.00
Lehigh, furnace, egg, and stove	6.00@6.25
"	6.00

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended March 29th, and year from January 1st:

TONS OF 2240 LBS.	1884. Week.	1884. Year.	1883. Week.	1883. Year.
Wyoming Region.				
D. & H. Canal Co..	61,283	673,242	111,738	822,840
D. L. & W. RR. Co.	88,785	985,753	109,160	1,006.275
Penna. Coal Co.....	21.581	204,753	35,549	270.698
L. V. RR. Co.....	30,398	278,901	30,903	247,352
P. & N. Y. RR. Co..	4,101	41.441	4,771	46.451
C. RR. of N. J.....	*	*	78,747	541,254
North & West Br. RR.....	16,511	193,676	9,903	129,616
	222,659	2,377,766	380,771	3,064,486
Lehigh Region.				
L. V. RR. Co.....	71,903	893,422	129,550	1,072.609
C. RR. of N. J.....	*	*	68,652	477.387
S. H. & W. B. RR..	4,021	46,865	706	4.655
	75,923	940,287	198,908	1,554,651
Schuylkill Region.				
P. & R. RR. Co.....	164,121	1,994,406	170,852	1,466,346
Shamokin & Lykens Val....	*	*	28,062	295,800
	164,121	1,994,406	198,914	1,762,146
Sullivan Region.				
Tidal Line&Sul.RR.Co.	1,533	18,503	1,560	15,085
Total...	464,236	5,330,962	780,153	6,396,368
Increase.....	....		.....	....
Decrease.....	....	1,065,406	.....	.....

* Included in tonnage of the Philadelphia & Reading Railroad.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1879	5,132.261 tons.
" " " " 1880	4,696.974 "
" " " " 1881	5,918.328 "
" " " " 1882	5,550,077 "

Comparative Statement of the Production of Bituminous Coal for the week ended March 29th, and year from January 1st:

Tons of 2000 pounds, unless otherwise designated.

	1884. Week.	1884. Year.	1883. Week.	1883. Year.
Cumberland Region, Md.				
Tons of 2240 lbs....	51,507	444,856	49,816	452,867
Barclay Region, Pa.				
Barclay RR., tons of 2240 lbs.....	5,190	86,669	8,412	88,875
Broad Top Region, Pa.				
Huntington & Broad Top RR., of 2240 lbs....	.....	42,322	4,222	56.850
East Broad Top....	.....	.....	.....	.....
Clearfield Region, Pa.				
Snow Shoe.....	4,099	61,316	3,843	65,817
Tyrone & Clearfield.	64,520	671,305	55,124	690,301
Alleghany Region, Pa.				
Gallitzen & Mountain	4,210	105,922	6,174	139,361
Pittsburg Region, Pa.				
West Penn RR.....	3,603	82,554	9,648	127,290
SouthwestPenn.RR.	2,595	37,889	3,28	34.456
Pennsylvania RR...	4,091	65,745	11,861	134,845
Westmoreland Region, Pa.				
Pennsylvania RR...	26,053	303,045	21,754	348,096
Monongahela Region, Pa.				
Pennsylvania RR...	2,486	41,939	.....	.....
Total.....	168,354	1,943,562	174,134	2,138,758
Decrease.....		195,196		

Comparative Statement of the Transportation of Coke over the Pennsylvania Railroad for the week ended March 29th, and year from January 1st:

Tons of 2000 pounds.

	1884. Week.	1884. Year.	1883. Week.	1883. Year
Gallitzin & Mountain (Alleghany Region)..... ...	2,428	32,869	2,574	30,195
West Penn. RR...	132	23,487	1,911	25,891
Southwest Penn. RR.....	47,388	526,120	41,373	475,057
Penn. & Westmoreland Region, Pa. RR...	4,105	49,841	4,254	60,393
Monongahela, Penn. RR	1,634	18,015	....	. .....
Pittsburg Region, Pa. RR	18	120	21	251
Snow Shoe (Clearfield Region)....	534	6,408	287	3,662
Total	56,239	656 860	50,420	595,449
Increase....	.....	61,411	.....	.....

Horsford's Acid Phosphate.

Decided Benefit.

Dr. JOHN P. WHEELER, Hudson, N. Y., says. "I have given it with decided benefit in a case of innutrition of the brain, from abuse of alcohol."

DIVIDENDS.

NEW YORK, April 2, 1884.

THE ROOKS MINING COMPANY HAS declared its first dividend, of seventeen cents per share, payable April 15th, 1884, at the office of the Treasurer of the Company, Room 8, Tremont Temple, Boston.

H. L. WHITE, Secretary.

OFFICE OF THE PLYMOUTH CONSOLIDATED GOLD MINING CO.

23 Nassau St., April 3, 1884.

DIVIDEND NO. 11.

The Board of Trustees of this Company have this day declared the regular monthly dividend of fifty thousand dollars, being one per cent on the capital stock, or FIFTY CENTS per share, payable on demand.

W. VAN NORDEN, President.

SAN FRANCISCO, April 3, 1884.

THE BONANZA KING CONSOLIDATED MINING COMPANY has declared

DIVIDEND NO. 5,

of twenty-five cents per share, payable on the 15th inst.

Eastern stockholders of record may be paid at the office of Laidlaw & Co., 14 Wall Street, New York. Transfer books will close on the 7th inst.

D. C. BATES, Secretary.

GRAPHITE

STEEL AND IRON COMPANY.

EXECUTIVE OFFICE,

52 BROADWAY, - - New York City.

New York, Penn. & Ohio

RAILROAD,

In connection with the ERIE RAILWAY,

FORMS THE

GREAT THROUGH ROUTE

BETWEEN THE

EAST AND WEST.

No Change of Cars between

NEW YORK, CLEVELAND, CHICAGO, CINCINNATI, AND ST. LOUIS.

3 THROUGH TRAINS 3

EACH WAY, DAILY,

With PULLMAN PALACE SLEEPING COACHES, Pullman Hotel Coaches, New English Buffet Cars, and Elegant Day Coaches. Only

20 HOURS - BETWEEN CLEVELAND.
26 " - NEW YORK CINCINNATI.
38 " - AND ST. LOUIS.

By taking the New Limited Train, without extra charge.

For tickets and further information, apply at all offices on line of road and of connecting lines, **asking for tickets via New York, Penn. & Ohio and Erie Railroads.**

A. E. CLARK, Gen'l Pass'r Agt.
J. M. FERRIS, Gen'l Sup't.
CLEVELAND, O.

SULPHURIC ACID

FROM

PYRITES.

Having secured the services of Mr. William Martyn, formerly assistant manager at Tennant's, Newcastle-on-Tyne, we are prepared to furnish **WORKING DRAWINGS** for any part of a **PYRITES PLANT** and to superintend their erection.

We have detailed working drawings for grate-bar furnaces, and also for smalls burners of the most improved patterns. These drawings give all measurements and quantities of material required, including **brick, ties, iron-work, tools, etc.** We will furnish the above, with full instructions, at a moderate cost.

We have upward of Thirty Thousand Tons of Ore now on dump at mine and railway station, ready for immediate shipment.

ONLY ONE GRADE OF ORE!

Highest and Purest in the World.

Produces Acid Perfectly White.

Absolute Freedom from Arsenic Guaranteed.

Ore delivered broken to proper size for burning if desired.

THE DAVIS CO.,
Charlemont,
Mass.

G. W. Coffin, Treas.,
3 Merchants' Exchange,
Boston, Mass.

ESTABLISHED 1856.

HENRY MAURER,

MANUFACTURER OF

FIRE BRICK

OF EVERY DESCRIPTION

FOR

Rolling-Mills, Iron-Works, Blast-Furnaces, Steel-Works, etc.

Clay Retorts for Gas-Works.

MUFFLES, CRUCIBLES, AND FURNACES For Smelting and Refining Purposes.

OFFICE AND DEPOT,
420 East 23d Street,
New York.

Works at
PERTH AMBOY,
New Jersey.

A MAN

WHO IS UNACQUAINTED WITH THE GEOGRAPHY OF THIS COUNTRY WILL SEE BY EXAMINING THIS MAP THAT THE

CHICAGO, ROCK ISLAND & PACIFIC R'Y

By the central position of its line, connects the East and the West by the shortest route, and carries passengers, without change of cars, between Chicago and Kansas City, Council Bluffs, Leavenworth, Atchison, Minneapolis and St. Paul. It connects in Union Depots with all the principal lines of road between the Atlantic and the Pacific Oceans. Its equipment is unrivaled and magnificent, being composed of Most Comfortable and Beautiful Day Coaches, Magnificent Horton Reclining Chair Cars, Pullman's Prettiest Palace Sleeping Cars, and the Best Line of Dining Cars in the World. Three Trains between Chicago and Missouri River Points. Two Trains between Chicago and Minneapolis and St. Paul, via the Famous

"ALBERT LEA ROUTE."

A New and Direct Line, via Seneca and Kankakee, has recently been opened between Richmond, Norfolk, Newport News, Chattanooga, Atlanta, Augusta, Nashville, Louisville, Lexington, Cincinnati, Indianapolis and Lafayette, and Omaha, Minneapolis and St. Paul and intermediate points.

All Through Passengers Travel on Fast Express Trains.

Tickets for sale at all principal Ticket Offices in the United States and Canada.

Baggage checked through and rates of fare as ways as low as competitors that offer less advantages.

For detailed information, get the Maps and Folders of the

GREAT ROCK ISLAND ROUTE,

at your nearest Ticket Office, or address

R. R. CABLE,
Vice-Pres. & Gen'l M'g'r.

E. ST. JOHN,
Gen'l Tkt. & Pass. Agt.

CHICAGO

BOOKS ON GEOLOGY,

Address

THE SCIENTIFIC PUBLISHING COMPANY

P. O. Box 1833, 27 Park Place, New York.

GOVERNMENT RAILWAYS

OF

NEW SOUTH WALES.

Contract for the Manufacture and Supply of 150,000 tons of Steel Rails.

To Ironmasters, Manufacturers, and Others.

The Government of New South Wales being desirous of encouraging the development of the local Iron Mining and Iron and Steel Manufacturing Industries, are prepared to receive Tenders for the supply of 150,000 tons of Steel Rails, to be manufactured in the Colony.

Sealed Tenders, marked outside "Tenders for the Manufacture and Supply of 150,000 tons of Steel Rails," will be received at the office of the Agent General of New South Wales, Westminster Chambers, Queen Victoria Street, London, E. C., not later than the 30th November, 1884, and at the Public Works Office, Sydney, not later than the 10th February, 1885, at which latter place the whole of the Tenders will be opened at 11 o'clock, A. M., on the day last named.

Each Tender must be accompanied by a Bank Deposit Receipt to the credit of the Commissioner for Railways in the sum of (£1000) one thousand pounds sterling, as a guarantee of good faith. Such deposit will be returned to the unsuccessful Tenderers as soon as the Tenders have been declared, but the deposit of the successful Tenderer will be retained as security for the due performance of the Contract. Tenders not accompanied by such deposit will be absolutely rejected as informal.

Printed copies of preliminary Specifications and Conditions of Contract may be obtained on application at the office of the Commissioner for Railways, Sydney, and also from the Agent General of New South Wales, Westminster Chambers, Queen Victoria street, London, E. C.

Delivery of the rails is to commence not later than 1st December, 1886, and to be at the rate of not less than 15,000 tons per annum.

Contractors must give full information and particulars in their Tender as to the process of manufacture they intend to adopt, and also whether they will be prepared to manufacture and supply, at rates to be afterward agreed upon, such points, crossings, fishplates, and fastenings, etc., as may be required from time to time for the rails under this Contract.

Contractors must state in their Tender whether they intend to manufacture the rails from native materials only, or whether, and to what extent, they intend to use imported material, giving a separate price per ton in each case.

As it is unlikely that intending Contractors will enter into an engagement of the above nature, without first satisfying themselves by personal inspection as to the position and extent of the raw material in New South Wales required for the manufacture of iron, every facility and information on this subject will be afforded on application to the Under Secretary of the Mines Department, Sydney, and free passes will be allowed on the Government Railways of New South Wales to representatives of Tenderers wishing to ascertain the resources of the Colony.

For the information of persons desiring to Tender, it may be stated that the official returns show that there were imported into New South Wales and Victoria (the two Colonies join each other, and are connected by Railway) within the last 10 years 1,250,000 tons of iron and steel inclusive of the permanent way material required for Government and other railways constructed during the period mentioned.

CHAS. A. GOODCHAP,
Commissioner for Railways.

Department of Public Works,
Railway Branch,
Sydney, 1st October, 1883.

FOR THE BEST

IRON AND STEEL

WIRE ROPE

SEND TO THE

John A. Roebling's Sons Co

TRENTON, N.J.

OR

117 & 119 LIBERTY ST.,

N.Y.

DAVY & CLANNY SAFETY MINER'S LAMP.

SAFETY WIRE GAUZE.

Tin Plate, Sheet Tin, Metals, Etc.

MERCHANT & CO., Importers, Philadelphia.

Rails and Railway Plant for Mines

FOR SALE.

Steel and Iron Rails and Fastenings from 8 lbs. per yard upward. LIGHT LOCOMOTIVES AND MINE CARS, NEW AND SECOND-HAND. Send for illustrated catalogue.

BARROWS & CO.,
Office 64 and 66 Broadway, New York.